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PSYCHOLOGY, ANTHROPOLOGY, AND RACE

BY ROBERT H. LOWIE

WHEN scientists ceased to quote farmers' tales about the cleverness of their horses or dogs and devised laboratory experiments for the testing of animal behavior, a new era began to dawn in the history of psychology. Psychologists are laying aside the anecdotal method in the evaluation of individual and racial worth, and every anthropologist will welcome an improvement in technique that promises to shed light on one of the most obscure of his own problems, the question of the interrelationship of empirically observed achievement and innate capacity. Unfortunately the psychologists who are most prominently associated with anthropological applications of their new tool are so ignorant of anthropology that their results are worthless. It may be said on their behalf that they have been misled by anthropologists, that we ourselves have been guilty of spreading erroneous conceptions, but that only makes matters worse. The situation thus justifies an elementary consideration of the points at issue, a review that shall dispel the farrago of bad logic, bad biology, and bad faith that continues to pervade discussion of racial endowment.

ANTHROPOLOGISTS AND HEREDITY

In the first place, it may be well to repudiate some absurd misconceptions, such as the strange notion that certain anthropologists favor an extravagant influence of environmental as contrasted with hereditary factors; and that they teach the absolute equality of all races, nay of all individuals. I do not of course pretend to know the views of all living anthropologists, but I am not acquainted with any colleague who entertains these

doctrines. Professor Boas is commonly mentioned as the champion of such dogmas. When, however, I turn from the garbled account of his conclusions in such works as Mr. Madison Grant's *The Passing of the Great Race* to his own statements, I find nothing to support such misrepresentation. Professor Boas argues for "a strictly limited plasticity" (*zugunsten einer eng begrenzten Plastizität*) under the influence of an altered environment.[1] On the subject of heredity he has this to say:

> Although we have seen that environment, particularly domestication, has a far-reaching influence upon the bodily form of the races of man, these influences are of a quite secondary character when compared to the far-reaching influence of heredity. Even granting the greatest possible amount of influence to environment, it is readily seen that all the essential traits of man are due primarily to heredity. . . . I am inclined to believe that the influence of environment is of such a character, that, although the same race may assume a different type when removed from one environment to another, it will revert to its old type when replaced in its old environment.[2]

Finally his statement as to the comparative mental make-up of Caucasians and Negroes is extremely cautious; he accepts the possibility of differences but is not convinced of such differences as would incapacitate the Negro for the exigencies of modern life.[3]

Personally, I take great pains to impress upon my students that the innate equality of all races is an unproved dogma, in spite of the fact that all the demonstrations of inequality hitherto attempted are scientifically worthless. Some time ago I formulated my views in the following words:

> As to the existence of superior races, I am an agnostic open to conviction. All evolutionists admit that at some point an organic change of fundamental significance occurred. It is *conceivable* that the Bushmen and Negrito, Pygmies and Negroes are organically below the remainder of living human types, and that differences of one sort or another even divide more closely related stocks. But between what is conceivable and what is definitely established there yawns a chasm, and where the scientist has no proof he holds no dogmas, though dispassionately he may frame tentative hypotheses.

This is not a very subtle point, but seems to transcend the comprehension of some writers. One of them has even gone so

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[1] F. Boas: The Mind of Primitive Man, p. 64; Kultur und Rasse, p. 67.
[2] The Mind of Primitive Man, p. 76 f.
[3] Ibid., p. 271 f.

far as to accuse me of denying innate *individual* differences, referring his readers to certain articles of mine that were expressly designed to illustrate these differences.

It is an interesting fact that those who most vociferously accuse anthropologists of underestimating heredity as compared with environment are themselves the worst offenders in this regard. How does President Osborn, for example, account for the differences of Cro-Magnon man in the Aurignacian and in the Magdalenian period? By the influence of environment! He writes as follows:

> It is probable that in the genial climate of the Riviera these men obtained their finest development; the country was admirably protected from the cold winds of the north, refuges were abundant, and game by no means scarce to judge from the quantity of animal bones found in the caves.[4]

> In the reduction of the stature of the woman to 5 feet 1 inch and of the man to 5 feet 3 inches, and in the reduction of the brain capacity to 1,500 c.cm., we may be witnessing the result of exposure to very severe climatic conditions in a race which retained its fine physical and mental characteristics only under the more genial climatic conditions of the south.[5]

This is environmentalism with a vengeance! One wonders why those who so readily account for a difference of 300 c.cm. in brain capacity and of *10* inches in stature by a change in geographical conditions refuse to admit that skulls may become somewhat narrower or wider under the influence of changed conditions. The difference of 10 inches in average height is about twice as great as the difference between the Scotch and the South Italians; it is greater than the difference between Andamanese pygmies and Frenchmen; equivalent to the difference between the Nilotics and the Vedda! What does Dr. Osborn mean? Does he believe that a climatic change effected a change in the germ-plasm tantamount to a heritable mutation? Or is he merely suggesting a "modification" in Baur's sense of the term? Even on the latter assumption, he is pleading for a potency of the environment that far transcends Boas's notion of a "strictly limited plasticity."

Mr. Madison Grant is not less of an environmentalist than his scientific sponsor, but apparently he attributes precisely the

[4] H. F. Osborn: Men of the Old Stone Age, p. 297.

[5] Ibid., p. 382.

opposite effects to the same climatic conditions. The Nordics, whom in the particular sections of the book I am now quoting from[6] he is pleased to favor, are said to have developed through isolation and the selection due to the rigors of severe winters, while under "the softening influence of a life of ease and plenty" they succumb.[7] Genial climate was necessary for the Cro-Magnons, the alleged spiritual forerunners of the Nordics, but a genial climate spells disaster for the Nordics, it seems.

Mr. Grant, however, not merely ascribes considerable influence to the environment when it so pleases him, but also implicitly denies the combined influence of both heredity and environment when the spirit so moves him. It is indeed one of his explicit cardinal doctrines that racial traits are "to all intents and purposes immutable," "fixed and rigid." He furthermore holds that in Sweden "there has been but a single racial type from the beginning" and once he even delivers himself of the statement that "Denmark, Norway and Sweden are purely Nordic."[8] Now we must recall that according to this author the Nordics evolved and actually flourish in the climatic conditions characteristic of their present habitation. Nevertheless he concludes a paragraph on the Scandinavian countries with this statement: "To-day all three seem to be intellectually anaemic."[9]

As a member of the Society for the Advancement of Scandinavian Study and of the Scandinavian Club of the University of California, I venture to stigmatize this proposition as arrant nonsense. But apart from the crass ignorance it displays of the intellectual life of the peoples lampooned, how is such degeneration intelligible on Mr. Grant's own principles? If the Nordics are by heredity a favored race; if the Scandinavians are pure Nordics; if they "flourish, do their work and raise their families"[10] in precisely the type of habitat they occupy; if racial traits "do

[6] Corresponding qualifications must always be understood to accompany expositions of this writer's views, which change from chapter to chapter, and sometimes even from paragraph to paragraph.

[7] Madison Grant: The Passing of the Great Race, pp. 38–41, 170 f.

[8] Ibid., pp. 15, 18, 169, 211.

[9] Ibid., p. 210.

[10] Ibid., p. 39.

not change during the lifetime of a language or an empire";[11] then, by what magical process, neither racial nor environmental, do these purest Nordics degenerate to a status of intellectual anaemia within a few brief centuries? Perhaps Mr. Grant is not, after all, the champion of heredity he professes to be when it suits his convenience.

Before leaving this writer, I will call attention to two sentences in immediate contact with each other in his chapter on "The Expansion of the Nordics." In the first, already quoted, the three Scandinavian countries are described as "purely Nordic." In the second, we are told that in southwestern Norway and in Denmark "there is a substantial number of short, dark round heads of Alpine affinities."[12] Comment is superfluous.

To sum up, it is not the professional anthropologist, but the professional heredity-monger that disregards the influence of heredity *ad libitum*. The anthropologist does not assert that the environment induces far-reaching effects on the germ-plasm: he merely asserts that certain phenomena change independently of the germ-plasm and in this claim he is fully supported by the attitude of Professor Elliot Smith, one of the few scientists with primarily biological orientation who have not disdained to try to understand the meaning of culture.[13]

Innate Ability and Culture

In the past, arguments on racial differences have almost always been advanced on the assumption that observed differences in cultural achievement must be the expression of correlated differences in inborn capacity. In one sense no one denies this; everyone would admit that a cat, a dog or a monkey is incapable of producing or sharing in human culture. The point at issue is, whether when the organization adequate to the production of culture, or, let us say, of the culture characteristic of the Upper Palaeolithic was reached, any further cultural advance was conditioned by equivalent changes in inborn equipment. The differences between

[11] Ibid., p. 15.

[12] Ibid., p. 211.

[13] G. Elliot Smith: Primitive Man (Proceedings of the British Academy, VII, 1916), pp. 37, 49 f.

the material culture of, say, the West African Negro or the Shoshoni of Idaho on the one hand and Western civilization on the other are so striking that most writers naïvely assume that they are patent proofs of organic differences, and popular prejudice doubtless rests on the same fallacy.

The argument is fallacious, in spite of its plausibility, for the following reason. When we study the known history of culture, we find great changes *without* any corresponding changes in racial constitution. In 1850 no one dreamt of crediting the Germans or the Japanese people with efficiency. Elizabethan England was very different from the England of Queen Anne's day; and those who talk as though an aversion to discussions of sex were a deep-rooted Anglo-Saxon trait have perhaps slight acquaintance with Fielding and the Restoration dramatists. It is true that Galton asserted a racial cause for the magnificence and the decline of Athenian culture, but his claim is an empty allegation and contradictory to his own interpretation of the Renaissance.

The instances hitherto cited involve, however, relatively slight differences when viewed in broadest perspective. Hence it seems desirable to supplement them by others. It is not merely admitted but contended that the Nordic race has not changed in inborn equipment for several thousand years except in so far as it has been debased by amalgamation with inferior types. Yet the culture of the Nordics has developed extraordinarily within the space of from two to three thousand years. The Cro-Magnons provide an even better illustration. They appeared about, say, 25,000 B.C. and persisted through Magdalenian times, which began about 16,000 B.C.[14] Here we have a race at least originally superior in inborn capacity to any now living, yet in 9,000 years or more they cannot rise above the level of the Stone Age culturally! Nay, the case is still more curious, for it is the *decadent* Cro-Magnons—short and with reduced brain capacity—who achieve the triumphs of Palaeolithic art!

Culture evidently does not vary with race according to any simple formula of functional relationship. This does *not* prove that the Tasmanians or Bushmen or Andamanese had the inborn

[14] H. F. Osborn: Men of the Old Stone Age, pp. 18, 261, 351.

capacity to develop unaided the civilization of Western Europe. It does prove that the difference of their culture from ours is not necessarily rooted in any innate difference, that the popular argument is wholly inconclusive. We simply do not know whether the evolution of *Homo sapiens* involved all the organic requirements for any type of culture known, or whether certain deficiencies, as yet undefinable, necessarily bar certain varieties of the species from independently attaining such and such a cultural status.

Since, then, the gross comparison of cultural achievement leads nowhere, so far as the determination of innate possibilities goes, let us turn for aid to the psychologist. Here, too, however, certain elementary precautions are prerequisite.

Preliminary Considerations

A comparison of distinct *groups* involves the consideration of both average values and variability. It is entirely conceivable that two groups should coincide in their average mentality but differ in range, so that one may produce far more remarkable individuals in both positive and negative direction than the other. Professor Fischer, for example, suggests that the Caucasian differs from the Negroid in precisely this point, while not excelling him in average intelligence. If this could be established, it would have far-reaching theoretical and practical bearings: it would account for the differences in cultural achievement without assuming that the *average* level of intelligence varies in different cultures; and it would imply that for the ordinary tasks of life the Negroid is as well fitted as the average white.

In connection with the occurrence of extreme positive variations it is well to bear in mind another point forcibly made by Father Wilhelm Schmidt. Extreme deviations from the norm naturally occur with greater frequency in large populations than in communities of several hundred. A class of fifty may have the average stature of the whole student body, but it is not so likely to have as tall members as occur in the total campus population of, say, ten thousand. It is not astonishing, then, that hordes of Andamanese or Australians numbering not over a hundred or two should never have produced the personalities which figure in the history of China, India, and Western countries.

Another caution is of tremendous importance. Since we are interested in establishing the existence or nonexistence of *innate* differences, the influence of training and other noncongenital factors, all of which for convenience' sake we may call environmental, must be eliminated. The light-heartedness, not to say unscrupulousness, of many writers on this point is appalling. Admitting, as they must, that an empirical test cannot eliminate the environmental factor, they decree that certain observed differences are too great to be explained by environmental differences, hence are evidence of hereditary differences. The illegitimacy of this reasoning is apparent as soon as it is couched in clear language. Letting H and E represent hereditary and environmental determinants, respectively, the empirical results may be formulated as follows:

$$H_1+E_1=A$$
$$H_2+E_2=A\pm m$$

It does not require a profound knowledge of mathematics to see that the difference $\pm m$ proves nothing as to the value of H_1 and H_2 so long as E_1 and E_2 differ by an unknown quantity. This is not academic logic-chopping pure and simple: we are told that Negroes are inferior to Caucasians because in certain tests 79 per cent of the former fell below C as against 25 per cent of Caucasians while only 1 per cent of the Negroes as against 12 per cent of the Caucasians scored above C. This difference, we are told, is too great to be interpreted as the result of educational and other social differences. But New York Negroes practically equal Alabama Whites in the tests! Hence the environmental factor *must* be taken into account, and unless we devise accurate methods for its quantitative determination, let us hold our tongues concerning inborn differences.

Racial and National Groups

It is a commonplace of modern science that racial and national groups rarely coincide. This has not deterred several prominent psychologists from blandly grouping immigrants into the United States according to their place of origin and then proclaiming that the results of the ensuing group tests are *racial* statistics. This is

the well-nigh incredible procedure of Dr. Robert M. Yerkes in an article on "Testing the Human Mind," contributed to *The Atlantic Monthly* for March, 1923. Dr. Yerkes not only brushes aside in cavalier fashion the educational differences discussed in the preceding paragraphs but cites tests on Italians, Poles, Turks, Greeks, *et al.* as establishing *racial* differences. He also ingeniously suggests that the Mediterranean element accounts for the low scores of recent immigrant groups; that element apparently possesses the miraculous quality of detracting from the Italian average by its presence and from the Polish average by its absence.

I wonder what would be thought of a naturalist who should wish to ascertain the characteristic weight of pure breeds of dogs by averaging an odd assortment of St. Bernards, dachshunds, and bulldogs and comparing the result with a corresponding average for mastiffs, fox terriers, and German police dogs. As a humble exercise in arithmetic the procedure may be justified, but its biological significance would be nil. Yet it would be better than Dr. Yerkes's method, for at least the naturalist would know precisely how many individuals of each breed he had weighed, but when Dr. Yerkes tests "Italians" he does not know how many of them represent each of the relatively pure types whose inborn endowments he is attempting to ascertain.

At this point I must register an emphatic protest against the naïve assumption that because certain individuals in a region in which mixture of types has demonstrably occurred display *physical* features characteristic of type A they are therefore likewise the possessors of the mental traits that are *ex hypothesi* distinctive of the primeval "pure" type A. President Osborn goes further and lays down the proposition that even when one of the most typical traits of the Nordic, blondness, is lacking the individual may still be "three-fourths or seven-eighths Nordic, because it only requires a single dark-eyed ancestor to lend the dark hair and eye color to an otherwise pure Nordic strain."[15] By implication dark hair and eye color will be the only features to dominate and the psychological traits of courage, loyalty, self-sacrifice and idealism innate in the Nordic will remain dominant in miscegenation.

[15] H. F. Osborn in "Preface to Second Edition" of M. Grant, op. cit. xi f.

There is of course not a shred of evidence in support of such a principle of inheritance. One might well despair of modern biology if such slovenly pronunciamentos were not rejected by sane students of the subject. As Doctors East and Jones point out, we must be

> very cautious about drawing genetic conclusions in the human race based upon the possession of particular traits, in the absence of proof of a long-continued isolation. . . . Traits originally characteristic of certain peoples because of isolation and the consequent inbreeding have been shifted back and forth, combined and recombined. . . . It is wholly possible, for example, that a tall, blue-eyed, dolichocephalic Frenchman really possesses less of the so-called Nordic factors than a short, dark-eyed round-head.[16]

Two other points may well be emphasized in this context. For one thing, the variability of "pure" types is largely unknown; we do not know, for example, how probable it is for a "pure" Alpine to vary so much from the norm of his type as to appear like a typical "pure" Nordic. Secondly, it is about time for writers on European anthropology to realize that things are more complicated than a hasty perusal of Ripley's book, now twenty years old, may indicate. Apart from the Adriatic or Dinaric race recognized by many investigators, we may have other types to consider if Dr. Czekanowski and other anthropologists are correct in their observations in Poland and Russia.[17]

Program

Is it, then, necessary to abandon all hope of progress in this field? By no means: a calm survey of the difficulties merely leads to a formulation that does not by necessity produce absurd and worthless results. We cannot hope to eliminate all disturbing factors, but that is equally true even of such ancient sciences as astronomy. We can at least get rid of certain conditions that are bound to vitiate comparative results.

First of all we must choose a region that is anthropologically well known and which has been demonstrably occupied by more than one racial strain, but in which strains are locally more or less

[16] E. M. East and D. F. Jones: Inbreeding and Outbreeding, 1919, p. 250.

[17] J. Czekanowski: Recherches anthropologiques de la Pologne, Bulletins et Mémoires, Société d'Anthropologie, 1920, p. 48 seq.

segregated. Without assuming that it is the only country suitable for the purpose, I venture to suggest that Italy provides a very favorable starting-point. The contrast between the North Italian Alpine type and the South Italian Mediterranean type is notorious. While of course minor variations are not lacking in the south, the uniformity of the South Italian population is remarkable.[18] The hair is almost always black; the nasal index for Abruzzi, Campania, Puglie, and Sardinia is 69.77, 69.68, 69.49, and 68.82, respectively; the stature ranges provincially between the narrow limits of 159.9 cm. for Basilicata to 162 cm. for Campania; "mixed brown" pigmentation occurs in at least half of the individuals examined, rising to 62.2 per cent in Calabria and 70.4 per cent in Sardinia. When we consider, on the other hand, such typical North Italians as the Piedmontese and Venetians, we discover that the hair is often, if not almost always, of chestnut color; that the mean height is distinctly greater than among the Mediterraneans—166.3 against 163.7 cm.; that there is an appreciable percentage of individuals with fair pigmentation. In addition there is the marked difference in head form: the Piedmontese with an index of 85.7 and the Venetians with an index of 85 are markedly brachycephalic; the South Italians while, contrary to current statements *not* dolichocephalic at present, are either mesocephalic or merely of moderately brachycephalic character. Nevertheless, when we compare the head form of the several South Italian provinces, the impression of homogeneity so strongly suggested by other physical traits disappears; between the extremes represented by Sardinia with 77.5 and Campania with 82.1 there are intermediate figures, such as 78.4 for Calabria and 80.8 for Basilicata.

These data furnish us with the possibility of sketching a program for psychological investigation. In the first place, it is probably not difficult to minimize the environmental factors: a thousand illiterate peasants from Sardinia will probably not differ notably in their cultural influences from an equal number of

[18] For the following data see V. Giuffrida-Ruggeri, A Sketch of the Anthropology of Italy, Journal of the Royal Anthropological Institute of Great Britain and Ireland, XLVIII, 1918, pp. 80–102.

illiterate peasants from Sicily. Secondly, when we find such regional differences in head form within an otherwise uniform population, they can plausibly be accounted for through racial mixture; specifically, the relatively broad-skulled groups are presumably such through the influence of Alpine mixture. The alleged innate mental differences are accordingly amenable to empirical verification or disproof: the Calabrians with an index of 78.4 may be assumed to be more like the Basilicatans (80.8) than like the people from Abruzzi (81.9) and Campania (82.1); the Sicilians (79.6) will be more like the Apulians (79.8) than like the other groups mentioned. I am well aware of the fact that very small differences, possibly derived from small series, may not be significant. It is also obvious that, with the variety of complicating factors, the ideal of quantitative refinement here outlined cannot be realized. Neverthless, if there is anything in the alleged mental difference of the Alpine and Mediterranean types, the *repeated* comparison of all the otherwise homogeneous Mediterranean groups differing only by a varying degree of Alpine admixture indicated by the cephalic index should constitute a crucial test. In Sardinia, with its excessively dark pigmentation, relatively greatest degree of dolichocephaly among the living (77.5), genuine dolichocephaly (71.53) of cranial material, and maximum trend toward curly hair and prognathism, an especially favorable opportunity presents itself for ascertaining the psychological influence of the Negroid strain that has plausibly been assumed as the factor determining these deviations from the South Italian norm. In the north, the aberrant case of Liguria, where the index of 79.34 stands out in marked contrast with that of the neighboring brachycephalic provinces, corresponding comparative tests seem desirable.

While I have stressed the cephalic index in view of Italian conditions, I should not like to be interpreted as disregarding other physical traits. In Portugal, for example, it may well be that the regional distribution of blondness would provide a better line of cleavage than the character of the head form.

A sane procedure will involve the systematic exploitation of *minimal* differences in conjunction with historical data. The

Danes are known to have had largely the same antecedents as the other Scandinavians but they are about three centimeters shorter and have an index of 80.7 as against 78.5 for Norway. To what extent do they differ in mental make-up from other Scandinavians? In Norway a number of interesting problems arise. In sections of the country where no Lapps are known ever to have existed there is a marked percentage of dark-eyed people.[19] This locally segregated group invites comparison with their typical blue-eyed "Nordic" neighbors. The latter may be compared with those Norwegian groups which have demonstrably intermarried with Lapps. Again, "pure" Lapps, such as those measured by Mantegazza, have an index over 87, while the "Lapps" of Troms, where mixture has occurred, have an index of 84.3, besides differing in other respects. Finally, the Karelian Finns differ appreciably from the Finns proper and might well be psychologically tested in comparison with them.[20] If I remember Professor Retzius's statement correctly—his volume is not accessible to me at present—the history of the Walloons imported into Sweden is fairly well known, and certain districts still clearly reveal the infusion of Alpine blood. Here, then, a comparison of Alpine and Nordic mentality may be feasible.

No doubt many readers of this journal can suggest additional problems. When psychologists without bias shall have attacked them and arrived at statistically unexceptionable positive results, i.e., shall have established real innate differences, anthropologists will accept the conclusions regardless of their personal predilections or prejudices. In the meantime it is their duty to denounce the charlatanism so prevalent in this field and to repudiate not biology but the sham biology that invents facts and even biological "laws" to support personal views.

UNIVERSITY OF CALIFORNIA,
BERKELEY, CAL.

[19] Halfdan Bryn: Troms Fylkes Antropologi, Christiania, 1922, p. 19.
[20] Ibid., pp. 33, 37, 174.

AMERICAN FEATHER-DECORATED MATS

By S. K. LOTHROP

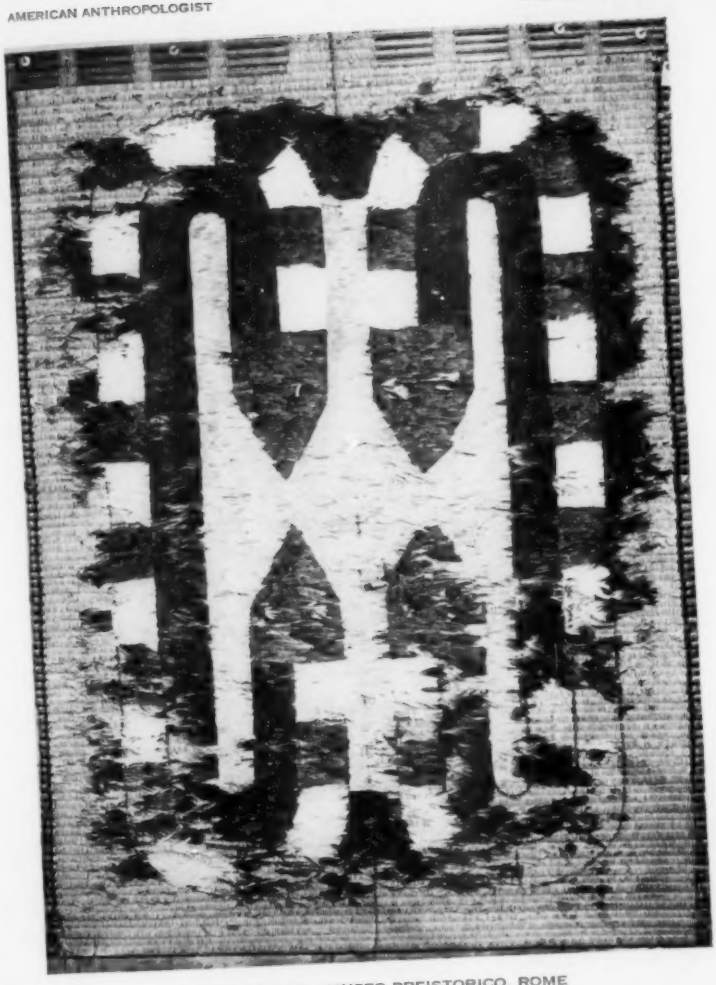
THE use of feathers attached to cloth or some other background in such fashion as to form a pattern is particularly characteristic of the New World. This art flourished, it is true, in certain islands of the Pacific, but scarcely attained the technical and artistic level established on the mainland. The specimens which survive today include remnants of the booty brought back by Spanish conquerors of the sixteenth century and others which have been found under ground in the exceptionally arid environment of parts of Peru. The colorful splendor which greeted the eyes of the Spanish invaders is perhaps most vividly brought home to the present day student by the few known examples of this lost art.

It is the purpose of this paper to discuss certain mats decorated with feathers which are preserved in Rome and Madrid. The Italian specimens are purely aboriginal in character, but those in Spain show European influence in the decorative motives. All these pieces, however, are technically unlike any examples of feather-work which have been published, and, for reasons stated below, it is the belief of the writer that they came from the northwestern part of Argentina.

The two specimens in Rome, illustrated in Plates VIII and IX, are housed in the Museo Preistorico ed Etnografico and are said to have come from Mexico. They are part of the Kircheriano collection, formed by the Jesuit priest Athanasius Kircher (1601-1680), and are therefore of considerable antiquity.[1] They consist of mats decorated with patterns worked out in various colored feathers.

The mats themselves are formed of thin slats of wood held together by a weft of white cotton thread. The three marginal strands of the weft are covered with a dark-colored gum which keeps them from slipping off the ends of the slats. At the top

[1] I am indebted to Dr. Ugo Antonielli for permission to photograph these specimens and for such information as is available concerning them.



FEATHER MAT. MUSEO PREISTORICO, ROME

FEATHERED MAT. MUSEO PREISTORICO, ROME

of each mat are four slats which are only partially woven in, but it will be noted that both pieces are complete, for no unravelling has taken place.

The feathers were attached to this base by inserting the end of each plume beneath the threads of the weft. As one feather overlaps another—with an exception to be noted presently—the whole construction is suggestive of shingling. The uneven lines of the pattern at the present time are caused by the fact that where a feather has fallen out one of another color has sometimes been exposed beneath it. Originally, however, the design was sharply defined, for the end of each plume was trimmed square. Along the sides of the mats run bands of large white feathers, now almost entirely destroyed. These feathers are several times the size of those which compose the rest of the field. They are attached by inserting their tops beneath the weft instead of their bases.

FIG. 49.—Detail of mat showing method of attaching feathers.

On one side of the mat these feathers run in the same direction as the majority but on the other side they lie in a reverse direction (Fig. 49).

The pattern on Pl. VIII consists of two double-headed monsters so curved that the heads face each other, like a letter C. The heads are blue; the bodies are red, white, and blue; the field on which they lie is orange and red. The pattern on Pl. IX has three somewhat similar double-headed monsters each curved like a letter S. The upper figure is black with red and white eyes; the lower pair are red with black and white eyes; the main field is orange with touches of red and blue. Neither of these designs is Mexican in character.

In addition to the feather pattern it will be seen that black lines appear on the sides of each specimen. These have been explained as caused by a glue which keeps the weft from slipping off the slats. In Pl. VIII a single gummed strand runs down the center and additional black lines can be seen under the central

pattern where the feathers have dropped off. These lines are formed of black pigment for the purpose of outlining the pattern before the application of the feathers.

Plate X shows part of a feathered mat which is one of six preserved in the Museo Arqueologico in Madrid. Although the patterns on all the Madrid specimens are obviously European in character the technique of manufacture is similar to that of the Roman examples just described in detail. The Madrid mats are said to have been collected in South America during the eighteenth century, an assertion which throws considerable doubt on the Mexican origin of the mats in Rome. Their place of origin, however, may be surmised through a study of the technique and the patterns employed.

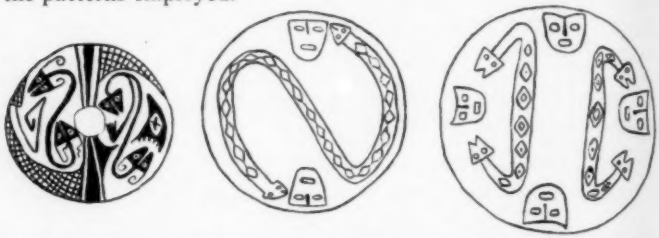


FIG. 50.—Decorative motives from northwestern Argentina: *a*. Pottery vessel, Salta Grande; *b*. Metal disk, Pampa Grande; *c*. Metal disk, Andagala. (*After Ambrosetti.*)

The mats themselves have no close parallel in any Mexican antiquities known to the writer, but similar though undecorated mats have been excavated in Peru.[2] The patterns on the Roman specimens, however, do not seem to be Peruvian, although they have a vague affinity with certain textile designs from that country. In Fig. 50 we give examples of a two-headed serpent motive from northwestern Argentina. This motive appears to be distinctly related to that on the mats. The culture of this area, usually known as Calchaqui or Diaguite, is local and individual, but exhibits intrusive Peruvian features. It is therefore quite in keeping with other finds that mats of Peruvian type should be decorated with patterns of local origin.

BOSTON, MASS.

[2] See Baessler: Ancient Peruvian Art, figs. 431 and 432.

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FEATHERED MAT. MUSEO ARQUEOLOGICO, MADRID

ON A PECULIAR TYPE OF WHISTLE FOUND IN ANCIENT AMERICAN INDIAN GRAVES[1]

By BROR GUSTAVER

THE Journal of the Academy of Natural Sciences of Philadelphia (Vol. XVI) contains a paper entitled "Some Aboriginal Sites on Green River, Kentucky—Certain Aboriginal Sites on the Lower Ohio River—Additional Investigations on the Mississippi River—by Clarence B. Moore, 1916," in which are depicted certain peculiarly shaped objects, of which a specimen, and in a couple of cases two, has been found in some of the many Indian graves excavated and examined by the writer. Some of these objects are made of antler; others, the greater number, are of stone. They all have one distinguishing feature in common, namely that of being drilled through with a straight, cylindrical hole, from 12 to 18 mm. in diameter. Most of the antler objects are of a natural, irregular shape, except that their upper ends have been rounded off and made smooth. The remainder are slightly conical (truncated cones).

The stone objects are more remarkable in appearance. In most cases they are almost triangular in section, one side being slightly convex, the other provided with a sort of ridge. The side edges have in most of these objects been given an inward sweep, in a few of the specimens they bulge outwards, whilst they are in no case quite straight.

Three of the objects may well be called "winged stones," the "body" itself with its centrally bored hole being shorter than the thin "wings" projecting from it on either side. Fig. 51, A, B, C, and D, shows four different types of these specimens, A and B with sections.

Together with these tubularly pierced objects there has been found in all the graves an implement of antler, the base surface

[1] To Count Eric von Rosen, who arranged to have this paper written, I herewith wish to present my thanks, for having given me the pleasure of studying these interesting whistles, for his great kindness in translating this paper into English, and also for his assistance in the publication of it.

of which has been hollowed out to a bowl-shaped depression, whilst its point end shows one or two notches (barbs). Also, these are depicted and described in Moore's paper. Moore presumes that the bored-through objects, particularly those made of stone, were sizers used in net-making, and that the long antler pieces with the notches were something like crochet needles with which the Indians wove their nets.

In a recently published paper which appeared in the journal *Ymer*, Count von Rosen[2] has propounded a wholly novel and interesting interpretation of these objects. As regards the latter group, the "needles," the reader is referred to the said paper, as they are not to be discussed here in any way. The

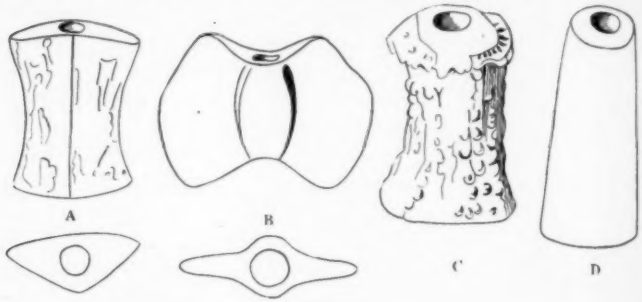

FIG. 51.

pierced objects Count von Rosen thinks are whistles, thus agreeing with Moore that besides being ornaments they had served some practical use. For a detailed account of the reasons upon which this opinion is founded, the reader is referred to the *Ymer* paper.

Count von Rosen has had replicas in wood made of four of the stone objects in question, and I have had the pleasure of seeing and testing these models. It was then found that they were remarkably well adapted to use as whistles, which circumstance I have accordingly certified in Count von Rosen's paper, at his request.

[2] Eric von Rosen: "En märklig visselpip typ [A Peculiar Type of Whistle]," Ymer (journal published by the Svenska Sällskapet för Antropologi och Geografi), 1921, p. 108.

In this paper I propose to deal somewhat more fully with the question whether these objects are fitted for use as whistles, in so far as it can be done without access to the originals.

I

To begin with, a brief account of what is known about tone production in pipes seems to me necessary. Its laws are well known, since the theoretical conditions have been analyzed in works by Bernoulli, Euler, Lagrange, and Helmholtz, only to mention a few of the investigators of this subject.

We know that the frequency n_m for the fundamental ($m=1$) and the overtones ($m=2.3$ and so on) of a pipe is computed from the following formulas:

(1) in a closed pipe: $n_m = \frac{2m-1}{4l} . h,$

(2) in an open pipe: $n_m = \frac{m}{2l} . h,$

where h is the velocity of sound in air, and l the length of the pipe. According to this simple theory, an open pipe of the same length as a closed one should give the upper octave of the latter. In reality it is, however, not so, for instead of the octave the seventh is obtained, which also happened in the case of the wooden models above mentioned (see Table I). The reason for this is the circumstance that the middle of the antinode does not exactly coincide with the open end of the pipe, but is to be found some little distance s beyond it.

The question is theoretically worked out for pipes with straight cylindrical bore, in the first place by Helmholtz, Lord Rayleigh, and Wertheim. The result, also confirmed by experience, is that the value of the displacement of the antinode outside the pipe is independent of the nature of the material and the length of the pipe and only depends on the diameter of the pipe bore. In narrow pipes the value of s was found to be 0.3 of the diameter of the hole but for wide pipes the correction approached the value of

(3) $s = 0.4d$

where d is the width of the pipe.

According to the theory of tone production in a pipe, the nature (material) of its walls does not influence the pitch, which only depends on the length of the air column. On the other hand, the walls are of some importance as regards *loudness of tone*. If they are thin, and of a less hard material, they are apt to fall into vibrations themselves when the pipe is blown with force. Energy is thereby consumed, and the tone weakens. A hard material is therefore favorable, as less energy is used up in the blowing.

The loudness of sound is greater in an open than in a closed pipe, as the sound is chiefly transmitted from the mouth where, in the case of the open pipe, the vibrating air column directly agitates the surrounding air. This may be easily observed if the open end of a sounding pipe is gradually closed up with the finger. The sound decreases in force, but the pitch is also lowered. This latter, however, occurs to a noteworthy degree only when the greater part of the hole has been blocked up. When all connection with the outer air has been shut off, the tone immediately drops to the octave below, which is the fundamental note for the closed pipe[3] of the same length.

Also, by the introduction into the pipe of a peg or similar object, it is within certain limits possible for the blower at will to vary the pitch of the note which, however, differs only by a very few steps from the fundamental of the open pipe.

The width of the pipe is of great importance in respect of the quality of the note. It has already been mentioned how the correction for the length of an open pipe depends upon the diameter. The tendency of a pipe for giving overtones also depends on its diameter. The overtones are, as a rule, produced by increasing the blowing force; now, as high tones are natural to narrow pipes, these easily give the first overtone, whilst the fundamental note is difficult of production. On the other hand, in wide pipes the fundamental note is easily obtained, more or less accompanied by overtones, by which the note receives its special quality.

[3] Taking into account the above-mentioned correction for open pipes, the interval will not be the octave but the major seventh.

II

We will now proceed to investigate the extent to which the laws of acoustics are applicable to the antler and stone objects in question. All of them being bored through with a straight, tubular hole of a uniform width, cylindrical and with a circular section, it may in the first place be laid down that it is *possible* to use them as whistles or flutes, and that they give notes the frequency of which may be computed from formulas (1) and (2). In the carrying out of the calculation, account must however be taken of the correction as set forth in formula (3). But also at the other end of the pipe, the following end, the middle of the antinode falls outside the pipe. The correction thereby necessitated I have empirically determined in the following way: By trying the four wooden models (vide supra) I determined the pitch, and computed the true length of the vibrating air column into the pipe (half of the wave length). The correction to be ascertained was then equal this length, minus for the closed pipe the actual length of the pipe, and, for the open pipe, this latter quantity increased by the correction for the lower open end. The result is shown in Table I.

TABLE I

Wooden model, No.	Pipe		Fundamental note		Frequency of vibration	Length of the vibrating air column, mm.	Length of pipe, corr. for open pipe, mm.	Diff. mm.
	length mm.	width mm.	{ closed pipe { open pipe					
1	92	12	g″		783	106	92	14
			f‴	sharp	1471	112	97	15
2	67	11.5	c‴		1044	80	67	13
			b‴		1957	85	72	13
3	65	11.5	c‴	sharp	1109	75	65	10*
			c⁗		2088	80	70	10*
4	42	13	f‴	sharp	1471	57	42	15
			f⁗		2784	60	47	13

Average of differences.....13

* This note is slightly too high. For a lower note the difference is greater than 10.

The correction experimentally found for the blowing end is therefore 13 mm.

In Table II, I have given the computed vibration numbers and the tone pitch for *all* the objects of antler or stone depicted by Moore[4] when used as open and closed sound pipes. In this table column 2 gives the locality of the find and the number of the grave, col. 3 the material, col. 4 the length and width of the pipes from measurements taken of the natural-size illustrations (col. 8). These measurements, particularly as regards the length of the bore, are no doubt more or less inaccurate, but may be taken to agree within 2 mm. with the corresponding lengths in the *illustrations*. Whether the dimensions given in the latter exactly reproduce those of the *objects*, is of course a matter beyond my judgment. The diameter is probably given with more exactness, as with each stone object there are three diagrams of its section (natural size). Column 5 gives the corrected value

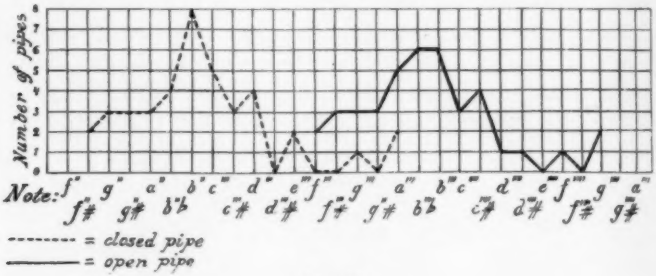

FIG. 52.

of the length [for the lower, open end according to formula (3), for the upper, blowing end *add* 13 mm.]. Col. 6 gives the frequency of the fundamental note, computed for open and closed pipes, [according to (1) and (2); the velocity of sound in air being taken as 333 m/sec.]. Col. 7 gives the names of the corresponding notes.

The distribution of the number of pipes over the different notes of the scale is shown in Fig. 52, which should require no further explanation.

III

It has already been stated that all of these objects *can* be used as pipes with which notes may be produced. Table II and

[4] Moore, loc cit.

TABLE II

1	2	3	4		5		6		7		8	
			Tubular bore		Corrected length		Frequency of the fundamental		Fundamental note for		Reproduced in natural size by Moore, loc. cit	
No.	Locality of find and No. of grave	Material	length mm.	width mm.	closed pipe	open pipe	closed pipe	open pipe	closed pipe	open pipe		
1	Austin place	Sandstone	68	12	81	86	1028	1936	e‴	b‴	Pl. IX	A
2	The Indian Knoll 99	Quarts	35	14	48	54	1734	3083	a‴	<g‴	" "	B
3	" " " 2	Limestone	66	14	79	85	1054	1959	e‴	b‴	" "	C
4	" " " 34	"	62	11	75	79	1110	2107	e‴ sharp	e‴	" "	D
5	" " " 45	Ferriferous fossil limestone	57	14	70	76	1189	2191	d‴	c‴ sharp	" "	E
6	" " " 29	Antler	70	<13	83	88	1003	1892	b″	b‴ flat	" "	F
7	" " " 124	"	101	<15	114	120	730	1387	f ″sharp	f‴	" "	G
8	" " " 29	"	82	11.5	95	100	876	1665	a″	g‴ sharp	" "	H
9	In the earth	"	82	14	95	101	876	1648	a″	g‴ sharp	" "	I
10	Austin place 16	"	102	16	115	122	724	1365	f″ sharp	f‴	Fig. 3	
11	Calhoun 2	"	93		106	111	785	1500	g″	f‴ sharp	" 4	A
12	The Indian Knoll 272	"	93	14.5	106	112	785	1487	g″	f‴ sharp	" 9	B
13	" " " —	"	77	16.5	90	97	925	1716	b″ flat	a‴	" "	C
14	" " " 77	"	90		103	108	808	1541	g″ sharp	g‴	" "	D
15	" " " 219	"	82		95	100	876	1665	a″	g‴ sharp	" "	E
16	" " " 84	"	93	14	106	112	785	1487	g″	f‴ sharp	" "	F
17	" " " 272	"	74	16	87	93	957	1790	b″	>a‴	" "	G
18	" " " 28	"	65	16	78	84	1067	1982	c‴	b‴	" "	H
19	" " " —	"	63	14	76	82	1095	2030	e‴ sharp	<c‴	" "	I
20	" " " 2	"	51	18	64	71	1301	2345	e‴	d‴		
21	" " " 202	"	88	14	101	107	824	1556	g″ sharp	g‴	" "	J
22	" " " 20	Limestone	58	>11	71	75	1172	2220	d‴	c‴ sharp	Pl. X	A
23	" " " 161	Striated clay slate	57	12	70	75	1190	2220	d‴	c‴ sharp	" "	B
24	" " " 163	Chalcedony	61	15	74	80	1125	2081	e‴ sharp	c‴	" "	C
25	" " " 115	Granite	71	12	84	89	991	1871	b″	b‴ flat	" "	D
26	" " " 82	Quartz	77	12	90	95	925	1752	b″ flat	a‴	" "	E
27	" " " 259	Gneiss	77	11	90	94	925	1771	b″ flat	a‴	" "	F
28	" " " 216	Siliceous mat. resembl. jade	74	12	87	92	957	1810	b″	b‴ flat	" "	G
29	" " " 87	Coarsely crystalline rock	68	12	81	86	1004	1936	b″	<b‴	" "	H
30	" " " 67	Siliceous rock	73	12	86	91	968	1829	b″	b‴ flat	" "	I
31	" " " 47	Quarts	75	12	88	93	946	1790	>b″ flat	>a‴	" XI	A
32	" " " 251	"	41	15	54	60	1542	2775	b″	f‴	" "	B
33	" " " 37	Clay slate	70	12.5	83	88	1003	1892	b″	b‴ flat	" "	C
34	" " " 93	"	50	13	63	68	1321	2448	e‴	d‴ sharp	" "	D
35	" " " 211	Limestone	87	13	100	105	833	1586	g″ sharp	g‴	" "	E
36	" " " 105	Striated clay slate	69	12.5	82	87	1015	1914	e‴	b‴	" "	F
37	" " " 95	Siliceous mat. resembl. jade	74	12	87	92	957	1810	b″	b‴ flat	" "	G
38	" " " 202	Quarts	60	12	73	78	1140	2134	<d‴	<e‴ sharp	" "	H
39	" " " 236	Gabbro	65	12	78	83	1067	2006	e‴	b‴	" "	I
40	" " "	Flint	34	12	47	52	1771	3202	a‴	>g‴	" XII	

Diagrams | Photographs | Diagrams

Fig. 52, show that all such notes fall within a very limited compass of the scale, most of them within one octave. Thus the open pipes give notes in the neighborhood of *c four-marked. This is exactly the most favorable pitch for a good whistle tone*, which should be sharp and piercing. Tones higher than this are thin, whilst lower ones are too dull and faint to be of much effect. It is probably no mere accident that all these antler and stone objects show such a conformity as to length. If they were intended for whistles, they have been given just the right length for producing a good whistle tone.

In all these objects the material consists of a *hard substance*, i.e., antler or stone. And, as has already been pointed out, this is also a matter of importance in the making of a good whistle, as the *force of the sound is thereby increased.*

The whistle should be blown with its ends open; this gives a higher tone and greater loudness. It is true that the closed pipe, too, will easily give a high note, namely the first harmonic, equalling the fifth of the octave of the fundamental note, but this is weaker in sound than the fundamental note of the open pipe.

The diameter of the bore is of the greatest importance. In narrow pipes harmonics are very apt to arise. In all these pipes, however, the bore is comparatively large. In open pipes this tends to render more difficult the production and appearance of the first harmonic, and *such pipes may be blown with great force, and yet give their fundamental note, whilst the first few overtones, which are always present, give the sound a penetrating shrillness.*

Although in these objects the similarity of length points to some definite purpose, such purpose might conceivably have been some other than the production of suitable toned whistles. Their decorative shape, and the finely worked material, in the case of the stone objects, speak for the probability of their having been used as ornaments and worn on a string round the neck. A thin cord through the bore does not interfere with the tone when an open tube is blown, if the bore is of the diameter that is here used. As these ornaments were worn on the breast, they could not conveniently be made more than 10 cm. long. In this way the adapted length might be explained. But the very fact

that the objects in question were worn round the neck on a string passed through the perforation provides our strongest, and decisive, proof that they are whistles. For in Moore's work are depicted five objects (beads, etc.), exclusively designed as ornaments, through each of which a hole has been bored for stringing on a cord. *In these the hole has a diameter of only 2 to 4 mm.* If the hole had been made only for the purpose of enabling the owner to wear the object strung on a cord, it is safe to assume that the trouble would not have been taken to make the hole from 11 to 18 mm. in diameter, and so even and smooth as is here the case. It would have been sufficient to make holes of the same diameter as those in the five ornaments just referred to.

In the objects with which we are concerned it is therefore clear that *the bore is the essential feature.* Add to this that the diameter of the bore in all these objects, including those made of antler, is strikingly similar, and precisely the one most suitable for a whistle.

In a flute, the mouth orifice is of the same size (11 to 12 mm.), and in the blowing of this instrument the notes are produced in exactly the same way as in a whistle of the type before us.

In conclusion I only wish, in a few words, to touch upon the practicability of using the four wooden models, frequently mentioned in the foregoing. This may be of interest as a means of inferring to what use the stone originals might have been put by their owners, the Indians. If we then know also the prevalence of the use of these instruments among the Indians, we may perhaps be in a position to draw interesting conclusions with respect to their cultural position. This is, however, a question I leave entirely to the specialists to discuss.

In the first place, as regards the possibility of producing tones in pipes of this kind, this is a fairly simple matter when blowing a closed pipe. It is like blowing a tone into the barrel of a key, but somewhat more difficult when the pipe is open. A little practice will, however, soon give proficiency. The blower can vary the note a little by changing the position of his lips at the end of the pipe. A certain position will be found the most favorable for tone production, and will insure the

loudest and most sonorous tone. The wooden models 2 and 3, Table I, which are of nearly equal length, may be blown so that the difference will be quite a semi-tone, but, on the other hand, in such a way that there is no difference at all. It is also possible for the blower to "tune" his instrument with his finger, when the pipe is blown open-ended. Yet it is hardly likely that the Indians, if—as is conceivable—they simultaneously used their pipes in chorus, tried for or obtained harmonious chords, for it may be taken for granted that in such case they would have made inter-attuned pipes, simply by modifying the lengths in the right way.

In Table III, I have grouped together such pipes as were found in the same grave, and therefore belonged to the same owner, in order to see whether they were attuned to each other.

TABLE III

Pipe nr. (Table II)	Nr. of grave	Fundamental Note		Intervals between the fundamentals	
		closed pipe	open pipe	closed pipes	open pipes
21 38	202 202	g″ sharp d‴ (c‴ sharp)	g‴ c⁗ sharp (c⁗)	fourth	fourth
3 20	2 2	c‴ e‴	b‴ d⁗	major third	minor third
6 8	29 29	b″ a″	b‴ flat g‴ sharp	major tone	major tone
12 17	272 272	g″ b″	f‴ sharp >a‴	major third	minor third

The notes of each pair of pipes, excepting the third pair, certainly sound in consonance, but the probability is slight that this has been aimed at.

When blown with the pipes open, the wooden models make excellent whistles. Especially is this the case with No. 4, with which it is easy to produce whistling sounds of such penetrating sharpness as to be almost deafening. The note is probably a resultant formed by the fundamental note and the nearest

harmonics, hence its discordant timbre. When the pipes are blown closed, they have a soft flute-like tone, the fundamental note then being produced almost pure.

It is possible to vary the pitch, but it requires a tolerably advanced skill to produce pleasant and pure notes of definite pitch. The introduction of a very thin peg into the pipe causes no noticeable change in the note. If the upper end of such a piston be flat and almost big enough to fill the width of the pipe, the note drops to a minimum only when the piston has been inserted to about one-third of the pipe's length. With the piston pushed half-way into the pipe, this one again gives its fundamental. In this position the piston does not interfere with the air vibrations inside the pipe, as then its flat end coincides with the node at the middle of the pipe. If the piston is pushed farther in, the thus shortened pipe will give a higher note. The interval between the highest and the lowest note in this way obtainable is about a fourth. Therefore it is hardly possible to play any melodies on these simple instruments.

A further interesting detail is found in the exterior shape of the stone pipes. The broad projections at their sides form excellent handles for holding the pipe when blowing it. Especially noteworthy in this respect are the three short whistles numbered 2, 32 and 40, respectively in Table II. (Winged stone, cf. Fig. 51, B.)

KARLSBAD,
SWEDEN.

THE NÁHUAN CHRONOLOGY: ASTRONOMICAL SIGNIFICANCE OF THE NUMBER THIRTEEN

By MIGUEL O. MENDIZABAL

THE finest spiritual manifestation of the American aborigines was indubitably their religious contemplation of the heavenly bodies—sublime symbols of the gods—their methodical and persevering studies of the phenomena that caused the apparent or real movements of the celestial bodies, and an active and superior intelligence which enabled them to evolve from their abstract conception of time a concrete system of chronometric calculation.

The glory of achieving by means of their calendary systems the maximum exactitude of their time—not exceeded in perfection even in our century—fell to the lot of the peoples of Náhuan affiliations, in particular those known as Toltecans.

Before delving deep into the subject matter, let us refashion hypothetically the evolution of their chronology, which, inasmuch as it was inextricably bound up with the development of astronomy, must necessarily have been shaped during many centuries.

The periodic alternation of light and darkness upon the earth gave birth to the first idea in chronology—charming legends of the love between Cipactonal (the Day) and Oxomoco (the Night), whereof the fruit was Time. Probably, in the dawn of their civilized life, they calculated time by making the astronomic day conform to the lunar periods, an elementary system followed still by some primitive American tribes. But the annual calculation necessarily required wider and more complex studies, and this computation was reached by utilizing their knowledge of the movements of the sun between the solstices and the equinoxes, which they called *Nahui-Ollin* (four movements). We lack data justifying the supposition that they attached chronologic im-

portance to the zodiac, although we know beyond peradventure that they were familiar with certain of its constellations.

The annual calculation, together with its corrections used to reconcile the civil with the astronomic calendar, unquestionably used by the Náhuas from very remote times, was based upon the chronologic concepts of the aborigines, with the same appreciation of the sidereal importance of the sun—this being the primordial and all-obvious deity of theogony. But their subdivisions and cyclical combinations constituted without doubt the origin and effect of the mythologic and astronomic differences—a veritable millenary battle launched by the priests of the rival gods Tezcatlipoca and Quetzalcóatl.

By virtue of this the priesthood of Tezcatlipoca observed closely and perseveringly the celestial course of the moon, since we know that the satellite of the earth was the sidereal representative of that deity. This ministry determined their four movements with relation to the equinoxes, *Nahui Ollin*, lunar, and *Ollin-metlli*, and assuredly combined the lunations as divisions of the year. We may permissibly so surmise from the fact that in the Náhuatl tongue *meztli* signifies both moon and month, for though Mendieta says that this use of the word *meztli* referred exclusively to the month in the Julian calendar, his assertion is illogical, inasmuch as the Spaniards did not call their month *luna*, the moon. Probably they finally made correcting intercalations in their lunar calendar to reconcile it with the solar regimen, though we lack data to affirm this despite the efforts which investigators have made to supply it.

Meanwhile the priests of Quetzalcóatl followed closely the movements of the planet Venus, coördinating her different movements with the apparent revolutions of the sun, arriving at the remarkable concept of the cyclical calendar, which constrains our admiration.

In the year 5097 of the indigenous era according to Ixtlilxóchitl (the year 700 of the Christian era), on the occasion of the beginning of the fourth sun or the cosmogonic age of Tlaltonatiuh, there assembled at Tollan a great number of erudite men to consider various happenings and the movements of the heavens

which had taken place since the birth of the world, and as a result the calendar was reformed. The chronologic regimen implanted by virtue of the meeting of learned Toltecans was, without doubt, the system which the Spaniards found to govern among the nations of Náhuan origin and among those which had been influenced by their pervasive culture. Was it in that memorable gathering that the lunar-month system fell into disgrace? Was it in some one of the previous foregatherings to which history vaguely refers? It were difficult to say; but if that system existed in the Náhuan chronology, there could have been no better occasion for its disavowal than the great meeting at Tollan, since it initiated, one may say, the period of splendor of the cult committed to the star Venus, sidereal representative of Quetzalcóatl, eternal rival through the cosmogonic ages of the moon, the astronomic representative of Tezcatlipoca. In any event, the movements of the moon did not in any wise intrude into the chronologic system established by the assembly referred to, as will be clearly shown in the course of the present study.

The ingenious pictograph for chronologic purposes which we know by the name of *tonalámatl* (schedule of days) or *cemilhuitlapohualiztli* (record of the feast or ritualistic days) was made use of by Náhuan priests, as the name indicates, to regulate the religious festivities. In it appeared twenty symbols: (1) cipactli, (2) ehécatl, (3) calli, (4) cuetzpallin, (5) cóhuatl, (6) miquiztli, (7) mázatl, (8) tochtli, (9) atl, (10) itzcuintli, (11) ozomatli, (12) malinalli, (13) ácatl, (14) océlotl, (15) cuauhtli, (16) cozcacuauhtli, (17) ollin, (18) técpatl, (19) quiáhuitl, and (20) xóchitl. These twenty symbols, repeated thirteen times in the order indicated, in consonance with a numeral of the series one to thirteen which is repeated consecutively twenty times, give as a result two hundred and sixty different ideograms, inasmuch as each symbol was acted upon once by each numeral. These ideograms are grouped in series of thirteen, in obedience to the numeral that acts upon them, thus constituting the twenty divisions of thirteen which are characteristic of the tonalámatl. Each symbol with its respective numeral represents one day in the calendarian ritual which, beginning its computation with the first symbol

cipactli, acted upon by the first numeral (one), corresponding to the first day, terminates at the end of the 260 with the last symbol xóchitl, acted upon by the last numeral (thirteen). This calculation was repeated without interruption or variation seventy-three times during the minor Náhuan cycle which had a duration of fifty-two civil years.

The civil calendar was not in reality another calendar, but an ingenious and special computation, worked out from the same tonalámatl, by which means the civil year unit of 365 days was obtained. If in the ritualistic calendar the tonalámatl was considered as divided in obedience to the series of numerals one to thirteen used in conjunction with the symbols, so obtaining the symbolic periods of thirteen, for the civil calendar the symbols themselves were taken into consideration, constituting the series of twenty symbol-divisions, as with our months, christened according to the principal festive day or the characteristic of the time which they embraced. And as eighteen of these months made only 360 days, the remaining five days were computed as outside of the months and given the name *nemontemi* (useless ones). Taking as an example the first year of an indigenous minor group or cycle in which the ritualistic and civil computations began conjointly with the symbol representing the first day, cipactli, acted upon by the numeral one, all the months of that year—the first in the reckoning—will run from cipactli to xóchitl in the order which we have indicated; the first thirteen-twentieths of the symbols or months will correspond to the first course of the tonalámatl; the remaining five months will correspond to the first five-twentieths of the symbols of the second course of the tonalámatl, and the complementary days, the nemontemi, correspond to the first five symbols of the sixth twentieth, that is, to the symbols cipactli, ehécatl, calli, cuetzpallin, and cóhuatl. The second year of the cycle, since we shall have to adjust its development to the immutable course of the tonalámatl, will not begin with the symbol cipactli, but with the symbol following that which constituted the last in the former, that is, with miquiztli, and the twenty symbols of the months will then run from miquiztli to cóhuatl, and to them as symbols for the "useless days" cor-

respond the five days which follow of the twentieth, that is, miquiztli, mázatl, tochtli, atl and itzcuintli. In the third year the months will run, consequently, from ozomatli to itzcuintli and the "useless days" will be ozomatli, malinalli, ácatl, océlotl and cuauhtli; in the fourth they will proceed from cozcacuauhtli to cuauhtli, with the symbols cozcacuauhtli, ollin, técptal, quiáhuitl, and xóchitl, as "useless days"; whence, xóchitl being the last symbol of the twentieth, the fifth year will again begin with cipactli, this especial distribution of symbols in months determined by the computation of the five "useless days," repeating itself in series of four years. But, as these symbols of the days are acted upon by a numeral of the series from one to thirteen, the result will be that each of the fifty-two years of the cycle will vary, either by reason of the symbol or the numeral, and will form fifty-two different calendars, resulting from the computation of the civil year in obedience to the unalterable course of the tonalámatl.

Each of these years in the series of four—different because of the disposition of the symbols—was represented in its turn by the symbols tochtli, ácatl, técpatl and calli, being repeated thirteen times in the course of the cycle; but as they were likewise acted upon by a numeral in the series one to thirteen, repeated four times, each of the fifty-two years had its proper ideogram and special name.

We have seen that, upon concluding the group or cycle in the minor Náhuan arrangement, the 260 days of the ritualistic calendar had run seventy-three times consecutively, without any variation whatsoever, while the 365 days of the annual civil computation had produced fifty-two different calendars. Both calendars began their progression with the symbol cipactli, acted upon by the numeral one of the series and terminated in perfect harmony with the symbol xóchitl, acted upon by the last numeral of the series (thirteen). That is, both calendars had a cyclical consonance at the end of each minor cycle. However, notwithstanding its calendarian importance, this was not the most important cyclical concordance, as we shall see in due time. At the termination of each group, or minor cycle, the Náhuans

refrained from computing thirteen days, with the purpose of reconciling their civil calendar with the astronomic calendar; and, when these thirteen days had passed, they began anew their computation of the cycle, precisely as they had done with the preceding cycle; both cycles formed a huehuetiliztli (old period or period to be reverenced), a cycle of 104 years, sacred among the aborigines. The union of the two cycles to form a huehuetiliztli they called toxiuhmolpia (binding tie of our years). A huehuetiliztli was succeeded in precisely the same manner by another huehuetiliztli; four constituted an age of 416 years—a cycle par excellence—wherein figured all calendarian and astronomic concordances. One age was succeeded by another age and so illimitably in the passage of time.

Now then, in the composition of the tonalámatl twenty symbols figure which are repeated thirteen times, and thirteen numerals which are repeated twenty times, making a total of 260 ideograms all of which are different. The computation of the civil year, wrought from the same ritual calendar, embodies three different numerical factors—365, the number of days; 18, the number of months; and 5, the number of the *nemontemi* (or "useless") days. In the indigenous minor cycle there appear as numerical elements: 52, the duration of the cycle in civil years and 73, the number of ritualistic years which constitute a group or cycle. The 73 ritualistic years run consecutively, without special name and without giving rise to divisions, but the 52 civil years continue grouped in four *tlalpilli* (periods) of thirteen years each, and each of these years, as we have already mentioned has a name and a symbol derived from the four symbols of the years acted upon by a numeral of the series from one to thirteen.

To recapitulate, we have as numerical elements in the calendars of a group or minor cycle, both ritualistic and civil, the following numbers: 20, 13, 260, in the tonalámatl; 18, 5 and 365 in the civil annual computation; 73 in the minor cycle of tonalámatl; 4, 13, and 52 in the minor cycle of the civil computation. The 18 and 5 are absolutely the arithmetical results of the division of 365, the number of days, by 20, the number of the symbols of the days, and 365 is the duration, in days, of the civil year;

73 ritualistic years and 52 civil years are numbers which have cyclical origin, inasmuch as at their termination the two computations agree. Accordingly we have remaining the numbers 20, 4, 13, and 260 as mysterious fundamental elements in the Náhuan chronology. Let us investigate their origin.

It has been supposed that the twenty symbols of the tonalámatl are derived from the division of the Náhuan zodiac into twenty constellations. This supposition is unsupported by any valid proof, and the probability of its being well founded would exist only if the symbols had referred to twenty periods, together embracing the 365 days of the year, since then they might be held to relate to the position of the earth with reference to twenty parts of the zodiac, but representing days as in the ritualistic calendar or periods longer than the year. As we shall learn in the course of this study, the assumption is illogical.

Don Alfredo Chavero opined, and quite justly, in my view, that the twenty symbols of the days were reduced originally to four fundamentals, disposed in the following manner:

Acatl, técpatl, calli, tochtli, ácatl,
Técpatl, calli, tochtli, ácatl, técpatl,
Calli, tochtli, ácatl, técpatl, calli,
Tochtli, ácatl, técpatl, calli, tochtli.

Chavero supposes that, to avoid confusion, they left to the initial days of the periods of five days their primitive names, substituting different symbols for the rest, although with the same symbolic signification. And, in consonance with this hypothesis, we need not now seek the origin of the utilization of the number 20, but that of 4 and 5; and this is more in harmony with the spirit of the numerical system of the Náhuans, since 4, the number of the human extremities, and 5, the number of fingers (or toes) of each extremity, are basic elements in the system. We can agree at the outset that the use of these numbers as fundamental elements in a chronology, by virtue of their numerical importance solely, or their basic importance perhaps, as in the present case, is inadmissible, or that it is restrictedly admissible—as a multiplier for instance of a number which may have some deep significance, mythical or astronomical, to obtain another number of the same entity.

What significance, apart from its numerical importance, could the number 4 have had in the conception of the aborigines? The answer is very simple—nearly all annalists, historians and archaeologists are in accord in the matter. Four was the number of the primordial gods—Tonacatecutli, Tonacacíhuatl, Tetzcatlipoca and Quetzalcóatl; four are the celestial bodies which they represented, from whose movements and positions their chronology was deduced—the Sun, the Earth, the Moon, and Venus; four the cosmogonic ages into which it was deemed the life of the world was divided—Tletonatiuh (fire or solar age), Tlaltonatiuh (earth age), Atonátiuh (water age, and age of the moon), and Ehecatonatiuh (air age, the Venus age); and likewise there were four universal elements—fire, earth, water, and air. The Sun was represented by its four apparent movements in the ideogram of Nahui-ollin (four movements) and Ollintonatiuh; the Moon was customarily represented similarly by an analogous ideogram, Ollinmeztli; the movements of the Sun produced and supplied the designations for the four seasons of the year; four were the cardinal points derived by the Náhuans from the movements of the Sun; and all these ideas, so diverse in nature and varied in effect, were represented by ideograms which were essentially analogous to the four symbols of the years and to the four initial days of the periods of five, which we might term the indigenous week. This makes it clear that the number 4 was not used exclusively as a numerical element in the calendarian combinations; its origin is theogonic, cosmogonic and astronomic, in addition to its being a basic factor in the numeration. Let us now pass on to the number 5.

Beginning with the erroneous supposition, which to date has served investigators as a basis, that the tonalámatl was worked out with the idea of measuring, for reasons ritualistic or mystical, 260 days in the year, and accepting as good the multiple reasons which we have given for the use of the number 4 as a basic element in the chronology, we should have to explain the use of the number 5 as being exclusively arithmetical to obtain, by the multiplication of 4, 5, and 13, the result 260, the days of the tonalámatl;

but, to discover logic in the system, we should have to explain the origin of the number 13 and the significance of 260.

Some students have sought to correlate 13 in a cosmogonic concept, inasmuch as 13 is the number of the firmaments which appeared on the first page of the Codex of the Vatican; yet neither were the interpreters in accord as regards this number, because of the mysterious quality of the Omeyocan (the second place, or two places), nor was the indigenous concept uniform in this regard, since there are traditions which embody eleven firmaments. The annalists differ similarly, for while Fray Bernardino Sahagún records thirteen, and twelve, Torquemada records twelve, and Muñóz Camargo, nine. In view of the obvious disagreement, it is impossible to accept the conclusion that the number of the heavens constituted the chronologic basis.

Other writers hold, along with Siguenza y Góngora, that the number 13 had its origin in the number of the principal gods, but, as we have said before (and this has an infinite number of corroborations in the Codices), there were four primordial deities in the Náhuan theogony, and it is necessary to bear in mind, in the supposition that 13 refers to the number of divinities—secondary, deities, whose number and importance differed among different peoples and in the various epochs—that the chronologic system remained, substantially, unchanged. Moreover, the nine divinities, called "Attendants of the Night," who represented successively patrons of the symbols of the tonalámatl, entirely defeat this hypothesis, since, being utilized as they are as a factor in the cyclic calendar, it is impossible to ascribe a oneness of origin to two different numbers which are to collaborate in the ultimate concordances of the calendars; and even though this were possible we should not consider as a fundamental calendarian factor a varying number of gods, particularly and chiefly where this hypothesis finds no substantiation in the indigenous paintings.

Similarly, attempts have been made to attribute an astronomic origin to the mysterious thirteen in connection with the movements of the moon. Boturin holds that the indigenes divided the lunations into two parts, one called *desvelo* (watching), when the moon illumined the night, and the other called *sueño* (sleep)

when the moon was visible by day, each having a period which continued thirteen days. Gama amplified and elucidated the same concept, saying that the thirteen units represented the diurnal movements of the moon, from the time it appeared after the conjunction until a little after the full moon, and this interval, during which the moon was visible, they called Ixtozoliztli; and when by night it began to disappear until the conjunction was near—when it was seen by day—it was called Cochiliztli, because they believed it then slept during the night. Orozco y Berra not only accepts the validity of this hypothesis, saying that thirteen represents one-half of the time in which the moon is visible during a lunation, not counting the days, a little before and shortly after the conjunction, when it is not visible; but goes farther in his idea that the thirteen units of the tonalámatl bear a relation to the movements of the moon, and in elaborating a cycle of 2,360 days by multiplying 260 (days in the ritualistic calendar) by nine (probably the "Attendants of the Night"), obtaining for result 2,340, to which he adds 20 days, that is, the series of 20 symbols, the result being 2,360—equivalent, with slight variation, to 80 lunations. But Mr. Orozco y Berra, despite this cyclic combination, so forced and arbitrary, failed to arrive at any calendarian concordance.

Chavero, on the contrary, rejects the hypothesis referred to, and triumphantly demonstrates that the legend of the *desvelo* (watching) and the *sueño* (sleeping) of the moon is analogous to the legend of the sun, which, according to aboriginal notions, served to light the dead during the night, being related, in consequence, to the movement of the moon in twenty-four hours.

The tendency, absolutely erroneous, of attributing to the number 13 a relationship with the movements of the moon, has its origin, apart from the imperious necessity of explaining its employment, in the fact affirmed by Gama that the indigenes called the tonalámatl also meztlapohualli (lunar computation). This should not evoke surprise, for it is easy to appreciate that the majority of the indigenes continued living in as utter ignorance of the secrets of science and of the mysteries of the Náhuan theogony as the Spaniards themselves—a natural result in such

an infinite number of theocracies, whose priesthoods were vitally interested in restricting the secrets of religion to the precincts of the temples.

Even the priesthood of the peoples of Náhuan origin—at least, many who constituted it—would indubitably have been uninstructed as regards the astronomic and theogonic annals of a chronology which they had received, pre-fashioned, as an inheritance from the Toltecs. At any rate, if they did understand them fully, they jealously guarded their secrets.

The origin of the number 13 has no relation to the lunations, for it is impossible to admit of a calendarian regimen which proceeds absolutely at variance with the phenomenon in which it had its origin, yet this would happen in our case since the computation of the thirteen units of the tonalámatl was successive and invariable, while the periods of thirteen days which students have sought to link up with the lunations would continue to succeed one another with an interval of a day—18 hours and 22 minutes, i.e., with a difference of 3 days, 12 hours and 44 minutes in each lunation. This is unacceptable, particularly since we have no data, either from annalists or the many different chronologic documents available, justifying the belief that a corrective factor existed—such as we use in harmonizing the civil year with the astronomic year—which served to reconcile the tonalámatl with the movements of the moon.

Yet I firmly believe, even though the destruction of the indigenous paintings has, perhaps, deprived us of the opportunity to verify it, that the Náhuans, profound astronomers, understood the movements of the moon as well at least as the movements of the other celestial bodies, since the lunar phenomena, manifesting themselves at short intervals, are easily observed; and probably they would have taken note of the cycle of nineteen years at the termination whereof the lunar phases coincide anew with the same dates in the solar calendar, or some other cyclic period, with relation to the different celestial bodies which attracted their continual observation; but I deny that these were included in their calendarian combinations, due to motives arising from religious conflict to which I have already made reference.

Thus, not discovering aught of astronomic origin in any celestial phenomenon in the period of a year, it remains for us to consider the matter only as a numerical element. Is this possible? By no manner of means, since it is not a fundamental number in the system of Náhuan numeration, like the 4, the 5, and 20. Mr. Chavero, considering the numbers 4 and 1 to be symbolic, as indeed they are, explains for us the origin of the number 4, saying that $4+4+4+1=13$; this cannot be objected to arithmetically, but it cannot be taken seriously; and even though we may assume for the moment that it did, indeed, have an origin exclusively numerical, we should do so in order to arrive at a given result, i.e., by the successive multiplication of 4 (a symbolic number) by 5 and by 13 to arrive at the number 260; and in this case 260 would hold the secret of the Náhuan chronology. How could this be?

Father Motolinía referring to the tonalámatl, says:

> This paradigm which is placed here may be called the calendar of the Indians of New Spain, reckoned from a star which begins to appear in autumn issuing from the west in the afternoons and manifesting a clear and resplendent light, as he who has good vision and seeks understandingly may see from midday on; this star is called Lucifer (Venus), also by another name, Sper, and from the latter name of the star our Spain called it Speria. And as the sun recedes and the days become shorter, it would seem that this star begins climbing up, each succeeding day appearing somewhat higher until, seemingly, the sun turns to greet it, in the summer being close to it and it finally merges with the sun in whose light it is lost to view; and during this period of days, from its first appearance and mounting on high and its final merging in the sun and disappearance, 260 days are counted on this Earth, and this number of days are embodied in the calendar or paradigm.

This interpretation of the great Motolinía contains a truth, namely, that the tonalámatl relates to the movements of the planet Venus, though not exclusively, as he asserts; and he is much in error in believing that the heliacal rising and setting of Venus, "which are as 260 days on this earth," to use his expression (in reality they are 292 on the average), constituted the basis of the ritualistic calendar. This system suffers the same defect as that which attributes the origin of the number 13 to the half of the lunations, i.e., a want of concordance between the calendar and the celestial phenomenon wherein it had its origin, since his

assigning, immediately and invariably, one course of the tonalámatl to another course, where there is no immediate heliacal setting and rising of Venus, would cause the ritualistic calendar and the movements of its planet to proceed in complete disaccord.

The tonalámatl is something grander and more perfect. Only our inexplicable ignorance of its origin and real significance has constrained us to devise so many ingenious hypotheses, in which, though with the best of intentions, we have ascribed to it imperfections which it utterly lacks.

Enrique Juan Palacios, in his admirable work entitled *La Piedra del Sol* (Astronomical Tablet of the Sun), to which production Mexico has not accorded the consideration it merits, maintains that the Náhuan chronology is formed of elements exclusively astronomic, and he is right, since the tonalámatl, which is the most excellent expression thereof, is the most ample and harmonious calendarian system that the human mind has evolved, and all the elements of it, absolutely all, are of astronomic origin.

To this day its origin has remained a mystery, for since those bent on research have directed all their efforts toward discovering the reason for the use of 260 (days) in the ritualistic calendar, seeking it in celestial phenomena equal to or less than this number, they have never been able to arrive at an acceptable conclusion. Let us attempt to find other solutions than those suggested by the vagueness of the significance of the word tonalámatl or tonalpohualli, because in either case, and even of others, as we have before intimated, the ritualistic calendar was well known.

Motolinía, referring to the significance of this word, tells us that this computation is called "tonalpohualli," which means sun record, because the interpretation and significance-scope of this word, by extension, means a computation-record of the planets and celestial bodies which illuminate and give light, and this did not connote solely the planet known as the sun. Although Motolinía makes this exposition with the object of dissociating the sun from this reckoning, we must take it in its true sense, that is, as not referring exclusively to the sun, yet not excluding it, since the reference is *precisely* to the combined movements of

the sun and of the planet Venus. Now then, if this word has a significance so broad in its scope that it relates to the light from the different celestial bodies, then the limits of this reckoning cannot logically be determined with exactitude; it may be annual if it relates to the sun, or refers to a period longer or shorter than a year, according to the celestial body indicated by it, and could even be cyclic if it relates to the luminous movements of two or more bodies in the heavens that have periodic concordance. And so, in fact, it is. The tonalámatl is a cyclic calendar of the movements of the planet Venus and the sun and it embraces an indigenous age of 416 solar years within which all the astronomic and calendarian concordances occur, and, at the same time, by means of an ingenious combination, it is a ritualistic calendar for 260 symbols.

The certitude of this duality of functioning of the tonalámatl will be made clear to us by a detailed and methodical study of the codices which contain these precious chronologic documents of the Náhuans. In the tonalámatl of the Aubin collection—unquestionably a ritualistic calendar—appear twenty characteristic divisions of thirteen; and in it appear the nine hieroglyphs of the deities called "Quecholle" or "Attendants of the Night," successively watching over the days. And, moreover, the 260 diurnal symbols are acted upon by their corresponding number of the series from one to thirteen. In this document the symbols unquestionably represent ritualistic days. The tonalámatl of the *Codice Matritense* (Madrilenean Codices), which illustrate the *History of the Things of New Spain* by Fray Bernardino Sahagún, published by Paso y Troncoso, presents to us its 260 symbols acted upon likewise by their respective numeral of the series from one to thirteen, a circumstance which makes us certain that they also represented days; but in this document the "Attendants of the Night" perform no *office of vigilance* of the days, as in the former, whence I believe it is not ritualistic in character, and that we should consider it rather as a perpetual calendar, since by its successive courses the civil computation may continue on indefinitely. In this case the "Attendants of the Night" would be supererogative, their true place being in the ritualistic calendar.

Finally, several paintings of the tonalámatl exist, such as those which appear in the Borgia Codex and in that of Bologna and the Vatican ritual, in which the 260 symbols are not grouped in thirteenths and are not acted upon by any numeral. In this last-named case the tonalámatl exercises its true function as a cyclo-astronomic calendar—the source of all other calendars; its symbols represent neither days nor years, but synodic movements of the planet Venus, as I shall demonstrate, relying upon the tonalámatl, by the first eight pages of the Borgia Codex. These are typical of those of their class, by virtue of their inclusion in the indigenous painting of most unquestioned authenticity and of highest chronologic value.

Mr. Palacios in his *Piedra del Sol*, referring to the fourth zone of chronologic symbols of the tablet referred to, comprising 260 points in groups of five—as a result of which they are known by the name "quintiduos" (pertaining to 5 and 2)—says:

> Until now, it has been understood that the elements in question represent the tonalámatl or cecenpohualli, fundamental computation of the indigenous chronology. Nevertheless, this is an error. In addition to its being inscribed on another portion of the relief, the distribution of the 260 numerals in groups of five, and not of thirteen, points, demonstrates by itself alone that it is not a sacred book, calculated fundamentally by thirteenths. The points in reference denote years, and not days as it has been supposed; and if they appear distributed in "quintiduos," it is because they relate to years of the planet Venus; that is, to synodic movements of this star, and they do not constitute a cycle in the calendar of the aborigines.

In fact, Mr. Palacios is right; the quintiduos of the *Piedra del Sol* represent synodic movements of the planet Venus which, having an approximate duration of 584 days, would be equivalent to five movements, i.e., to 2,920 days, representing the duration of eight solar years, whence the movements of both celestial bodies make a cycle every eight solar years, and, accordingly, the 260 points of the quintiduos of the fourth zone of the *Piedra del Sol* are equal to 416 solar years.

Now then, the zone of quintiduos of the *Piedra del Sol* has a chronologic value precisely equal to the tonalámatl of the Borgia Codex, or, to express it better, it is a tonalámatl that represents 260 synodic movements (not years of Venus), and, consequently, 416 solar years, or one indigenous age. Mr. Palacios is in the

right in denying that this zone is the "cecenpohualli," a name for the tonalámatl serving as a ritualistic calendar; but he is in error in not granting this as regards the tonalámatl, for this is *precisely* its appropriate name, and by extension only did the Náhuans give it the name cecenpohualli or ritualistic calendar, since its 260 diurnal symbols did not have for their purpose the representation of the computation of light from any star, being used solely in connection with things calendarian because of its mythical importance.

A demonstration of the truth of this affirmation is given us by the Borgia Codex. In the tonalámatl, which appears in that Codex, the symbols are not grouped in thirteenths but in quintiduos, that is, in groups of five symbols and, as we have said before, are not affected individually by any numeral, as happens in the case of the ritualistic calendar; but each of these groups of five symbols exercises an effect and is, in turn, itself affected. This gives us a clear conception of the uniformity of chronologic value furnished by ideograms that, despite their variableness in execution, embody, essentially, the idea of the cycle of Venus and the Sun, and of the five synodic movements corresponding to eight solar years. The correctness of this interpretation is clearly revealed: each of these ideograms represents the moment when Venus and the Sun, after their first five apparent movements in position-change and the second eight of their apparent movements around the Earth, are seen to be, in the cycle, in the identical position with respect to the Earth that they occupied upon the termination of the past cycle, eight years before. Logically, we must admit, in consequence, that the symbols of the tonalámatl grouped here in quintiduos relate also to the synodic movements of Venus; and in this case the word tonalámatl has indeed a perfect application, since it refers to the cyclic computation of the light of the two celestial bodies.

But there is something more conclusive still for the demonstration of the truth of this assertion: many of the ideograms to which we have referred that have a chronologic value equal to five synodic movements or eight solar years represent two celestial bodies—the Sun and Venus—and furnish the basis for the cyclic

calendar, and these ideograms are formed by an arm and hand, the latter grasping an arrow symbolic of the light of the sun, a double arrow symbolic of the light of Venus, the beautiful astral twin, the star of the morning and of the afternoon, and still another arrow perfectly characteristic. The interpretation in this case is manifest; in this cycle three computations coincide. Moreover, corresponding always to this third arrow, we see in the ideograms adverted to, alternating with the five numerals corresponding to the synodic movements of Venus and the eight numerals relating to the eight solar years of the cycle and affecting in conditions of equivalence the quintiduos of symbols of the tonalámatl, representative of synodic movements of Venus, several ideograms in which, in diverse fashionings and varied form, appear clear and unmistakable thirteen numerals. The fact that, on repeated occasions, these numerals figure in the ideogram of the cycles and with the symbol of the light, corroborates our idea that they relate to a celestial phenomenon repeated thirteen times, while the synodic movements have occurred five times and eight solar years have elapsed. What is the significance of this mysterious thirteen in this cyclic computation? The answer is found in a study of the movements of the planet Venus which the Náhuans understood so thoroughly. The thirteen numerals are thirteen Venus years, that is, thirteen revolutions which Venus has made around the Sun in executing five movements of apparent position-change or synodic movements—real and apparent movements which Venus executed in the space of eight solar years.

Five synodic movements; eight solar years; thirteen Venus years: here we have the astronomic significance of the number thirteen, fundamental in the chronology, since the "five" is derived from the harmonious movements of the "beautiful astral twin," Venus, personification of the favorite deity of the Toltecs, coördinators of the unsurpassed Náhuan chronology. We have here, in my opinion, the incontrovertible demonstration of the significance of the ideograms of the Borgia Codex.

One point remains to us for solution. Why did the Náhuans employ as the "perfect" cycle the indigenous age of 260 synodic movements or 416 solar years, and not some other cycle? The

answer is so simple that it will be altogether satisfactory. We have seen that, calendrically, the civil and ritualistic computations formed a cycle at the termination of each group of fifty-two years, but only at the end of a "huehuetiliztili" of 104 years did the calendarian cycle coincide with the astronomic cycle of Venus and the Sun. This coincidence, however, was not sufficient, inasmuch as it lacked a most important ritualistic concordance which took place only at the termination of each age, as Enrique Juan Palacios explains in his *Piedra del Sol:*

> At the same time the figure 151,840 (the number of days in 416 solar years) has the notable quality—unnoted to this day so far as we know—that, being multiple, with a unit difference, of the numeral nine, the characters of the tonalámatl (called Quecholli or Attendants of the Night) embody in themselves a complete operative entity, since on the final day two characters are superposed, in accord with the usual practice of those who had directive power as regards this book. As we have seen, only at the termination of the indigenous age had all of the calendarian concordances taken place.

Moreover, in the calendar containing 260 symbols the sacred numbers came into play, inasmuch as 260 is the product of the multiplication of 4 by 5 by 13, and the 416 equivalent years may be grouped also, as, indeed, they were, by virtue of the sacred numbers, into four "tlalpilli" of thirteen years which twice repeated in the age the sacred number four. And there is more yet. By means of an exclusively calendarian combination, of great simplicity and incomparable harmony, the calendarian cycle of 260 symbols could be used only in the form of a ritualistic calendar, inasmuch as each symbol or synodic movement of the tonalámatl comprised 584 days, being equal, taken together, to 151,840 days, and, consequently, the 260 symbols repeated 584 times could elapse in an age signifying days, being different solely from the peculiarities of the tonalámatl, equivalent to synodic movements, by virtue of the numerals of the series one to thirteen which affected them and which, repeated twenty times, gave to the numerals the very important collaboration of the sacred numbers 13, 4, and 5. The calendar thus formed served, by reason of the sacred origin of all of its elements, to regulate the religious festivities, on which account it was called cecenpohualli or cemilhuitlapohualiztli; but as by virtue of the indefinite succession of this

ritualistic calendar, due to its cyclo-astronomic origin, final concordances could be worked out—the computations of the synodic movements of Venus, of the Venus-years, and of the solar years—they called also, by extension, the 260 daily symbols of the ritualistic calendar tonalámatl or tonalpohualli.

This is the reason for the utilization of the age of 260 synodic movements, 416 solar years, and 676 Venus-years as a perfect cycle in the Náhuan chronology; and such are, in my view, the astronomic and mythic origins of the tonalámatl-calendar (cyclic, astronomic and sacred); and of the cecenpohualli-calendar, (ritualistic), foundations both of the Náhuan chronology.

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Although the subject of corrections is important enough to merit an especial study, I shall refer to it here, in concluding, though briefly.

We have said that at the termination of each group or minor cycle of fifty-two years, the Náhuans refrained from counting thirteen days with the object of reconciling their civil calendar of 365 with the astronomic calendar. And, though in this regard there is difference of opinion, I incline to the system espoused by Siguenza y Góngora and other authors of weight, at least so far as concerns the Toltecan people, authors of the Náhuan chronology, in the first place because it is in perfect accord with the religious spirit which represented the norm of the calendarian science of this people, in view of the manifest mythical importance of the number 13; and, in the second place, because the correction did not apply with respect to the tropical year of 365 days, 5 hours and 48 minutes, but as regards the sidereal year of 365 days, 6 hours and 9 minutes, due to the relative position of the Sun, Venus, and the Earth that governed their astro-chronologic calculations, the correction being of thirteen days, notwithstanding the difference of 2 days, 14 hours and 24 minutes, which on the termination of the age, remained to be corrected—the system which presented fewest possibilities of error.

As the revolutions of Venus around the Sun consumed 224 days, 16 hours, and 49 minutes, and her synodic movement 583 days, 22 hours, and 6 minutes, the five synodic movements

of the cycle took place in 2,919 days, 14 hours and 30 minutes while the thirteen revolutions thereof were equal to 2,921 days, 2 hours and 37 minutes. That is, Venus had five synodic movements, traversing her orbit thirteen times, less a fraction in her final revolution, which it would have to cover in 1 day, 12 hours and 7 minutes, there being in consequence each eight years of the cycle a difference of 1 day, 12 hours and 7 minutes between the movements, one real and the other apparent, of the planet. But, as this difference relates to position only and absolutely, it is not likely or probable that the Náhuans had been able to appreciate it, assuredly depending upon their astronomic observations and, for their chronologic requirements, being governed by the relative position, i.e., the place occupied by Venus in space in relation to the Sun and the Earth, or, say, the cyclic situation resulting from the synodic movement or from the apparent position-change.

Now then, since the five synodic movements comprise 2,919 days, 14 hours, and 30 minutes, and the eight civil years of the cycle 2,920, a difference results of 9 hours and 30 minutes every eight years, easily rectified with respect to the calendar. But since the Náhuan calendar had as its astronomic basis the cyclic movement of two astral bodies, and there being a difference, though slight, between the duration of the cyclic movements of Venus and the Sun, as between them, and also as regards the calendar derived from them, and calendarian rectification being only possible with respect to but one of these celestial bodies, the Náhuans chose the Sun, as we have seen before, as the immutable norm of their time.

At the termination of the cycle the astronomic concordances of the movements of Venus and of the Sun did not coincide in consequence with respect to the date of the calendarian cycle. This inevitable anomaly, since its origin was a real difference in time, lacked prime importance for the exactitude of the time computation, since it was obtained with absolute precision by means of solar calculation; yet it did have great mythical importance. It is unquestionable that the priest-astronomers were able to remedy this in some ingenious manner, and though I have not

yet encountered anything reminding one of this concrete case in the indigenous paintings, on the other hand we do have sufficient data to justify the belief that they were able to rectify this error, refraining from calculating, till the termination of each age, the 16 days necessary to initiate their new computation in the succeeding heliacal rising; or, and this is more probable still, refraining from calculating twenty days in order to begin their calculation the first day of the next heliacal setting.

In this manner they were rectifying, at the same time, the difference of 2 days, 14 hours, and 24 minutes between the civil calendar, now rectified by the thirteen intercalary days of the minor cycle, and the sidereal year. These days were certainly computed separately in order not to lose chronologic exactitude, and were doubtless dedicated on their ritualistic occasions to solemn and special religious ceremonies.

Apart from this, the rectification did not pass from theory to reality, since the unhappy life of the aboriginal nations assuredly did not permit them to put this system of rectification into practice; some other nation, in that migration of peoples from the North toward the South, forced out the indigenes from their cities and their fields; some deep-rooted religious system or internecine strife dispersed nationalities, paralyzing all life and, naturally, interrupting the chronology. When the dispersed groups had again organized and formed new nationalities, the new computation of time began on an astronomically propitious occasion.

MEXICO CITY,
MEXICO.

SOCIAL LIFE OF THE ESKIMO OF ST. LAWRENCE ISLAND[1]

By RILEY D. MOORE

General Environment

THE ISLAND of St. Lawrence is located in Bering Sea, about one hundred and eighty miles south of the Arctic Circle, forty miles from the Siberian and a little over one hundred miles from the nearest point on the Alaskan coast. It is from twenty-five to thirty-five miles in breadth and eighty-five in length. The interior is mountainous, reaching an extreme altitude of about fourteen hundred feet; the rest is a relatively flat tundra. In places the surface is very rocky, rough and irregular. Lakes and small streams of fresh water are numerous. Much of the country, both in the high and in the low lands, is marshy, making travel by land very difficult in the summer, the feet sinking from four inches to a foot into the wet, spongy soil at every step. The coast line is irregular and the shore in many places precipitous. Some low sand spits project into the sea, and have always been the favorite village sites of the natives. The climate is disagreeable during the summer; rains are frequent and hard, strong winds blow much of the time, several successive days of sunshine are very rare, and there are dense morning fogs. The summer temperature reaches about 40° Fahrenheit or a little above, 56° being that of the warmest day, July 8th, in the summer of 1912. Winter may set in any time after the middle of August. The first snow in the winter of 1912–13 fell on August 30. In October the thermometer stood between 20° and 26° during the day, dropping somewhat

[1] The writer visited St. Lawrence Island in 1912 under the auspices of the Smithsonian Institution, in its interests and those of the Panama-California Exposition, San Diego, 1915. With one exception the illustrations are from photographs taken by the writer and he wishes to extend thanks to the Smithsonian Institution for the use of them.

Acknowledgment for valuable assistance is also due to Dr. Walter Hough and my good friend, Dr. John R. Swanton, the editor of this JOURNAL.

It is to be understood that the description of the St. Lawrence Islanders here given applies to the period above indicated.

lower at night. Strictly speaking there are but two seasons, summer and winter, with about three and one-half months of the former and eight and one-half of the latter and with the change from the one to the other generally quite sudden. The approach to the island is sometimes blockaded by ice until well into the month of June.

The winters while long are not excessively cold, but those in which 30° below zero, Fahrenheit, is the extreme temperature are said to be fairly common, though occasionally there will be a colder season. A mild winter is to the natives a "woman-winter" and a severe one a "man-winter." Sudden changes in climatic conditions which often prove disastrous to the health of the community are common at all times of the year.

Former Subdivisions and Government

In 1912 there was but one village of importance on St. Lawrence Island. This was built upon a sandspit which forms the northwestern extremity of the island. It was called Sēēvuookôk (Chibukak on the maps) by the natives, and the inhabitants of the village were known as Sēēvuookōkmĭt. On Southwest Cape there was a small settlement of nineteen people, Powōēluk, and at the reindeer station, Camp Collier, about forty miles to the eastward of Sēēvuookôk, another village, the population of which varied with the seasons. In summer there were often as many as forty at this place. Sēēvuookôk, with a population of somewhat more than two hundred, was composed of the remnants of what were once five different clans, the Wallit being the original owners of the village site. Of the other inhabitants, part came from Southwest Cape; from an old village a few miles to the eastward of Sēēvuookôk came the Murruktumit and from still farther to the eastward came the Nungoopugah′kumit, while the Avhrumah′rumkut or their ancestors came from Indian Point, forty miles away on the Siberian Coast. Except for the latter clan the natives believe themselves to be autochthonous.

Tribal lines no longer have much significance among them. Their present political organization might be considered as a loose confederation of small autonomous groups or patriarchally

governed families. These groups are composed of two or more male relatives with their families, all of whom live in the same house. In all matters of community government, the old men, "strong men,"[2] sorcerers, and boat captains have much influence, but little positive authority. The St. Lawrence Islander's habits of life are regulated by the unwritten laws of custom and tradition which he seldom contravenes, except to obey the stronger laws of necessity and self-preservation. But, should he choose at any time to be a law unto himself, there are none with authority to command that he do otherwise; however, in extreme cases, if his actions are considered inimical to the better interests of the community, the influential men of the island decide what action will be taken and, willing or unwilling, he must accede to their demands. But it is seldom necessary to resort to strenuous punishments. From various references to chiefs in their folk tales, it appears that the present form of government, or rather lack of it, is comparatively recent.

Clothing

In their clothing, both beauty and utility come in for due consideration. The combinations of furs of various colors and varieties, or of bird skins of various sorts, often show excellent taste and much skill. Generally speaking they wear tight clothing in summer and loose in winter. With them "right side out" means "fur side in" but according to whim or fancy clothing may be worn one way one day and the other the next. In pattern it is in some respects like that worn by Eskimo elsewhere, but it approaches nearer and, in some cases, is identical with that of the coast tribes of northeast Siberia.

The men wear coats or parkas which are slipped on over the head much as one would put on a closed shirt. These are made of reindeer skins or the breasts of birds. The former may be made with a hood attached, or without like those worn on the Siberian side. All are cut square around the bottom and reach about to the knees. While hunting or working, the coat is generally bloused and belted down. The hoods are bordered with a strip

[2] See p. 363 f.

of dog fur which keeps the wind out and protects the face. The cuffs of the birdskin coats are strengthened by binding with a strip of hair seal skin.

To protect the skin clothing a snow-shirt, or, in bad weather, a raincoat, is worn over the parka. These are made from the intestines of the seal or walrus which have been soaked, scraped, inflated, and dried. Those intended for snow-shirts are beautifully bleached by freezing, aided by the action of sleet. In the snow-shirts and raincoats worn by the men the raw seams and stitching are on the outside of the garment while they are hidden in those of the women. The hoods are bound with a narrow strip of brown leather and kept snug about the face by a drawstring. In the snow-shirts are often inserted small gores of brown leather, or they are ornamented along the seams with the crests of the crested auklet. Sometimes tassels (probably devil chasers) made from the fur of the unborn seal, dyed a dark walnut brown by boiling with bark, are sewed on in rows. These decorated snow-shirts are frequently used as ceremonial regalia. Muslin, calico and ticking obtained from traders are now used considerably for snow-shirts. In pleasant weather this garment is often omitted.

The men wear close-fitting pantaloons made from the hair seal, fur out. These are cut extremely low in the waist and reach to the ankles with draw strings at top and bottom. Under these, as drawers, in winter, is worn another pair of similar pattern made of reindeer skin and worn with the fur side next to the body.

The summer boots are made from the hair seal, fur in; the soles are of young walrus hide or the hide of the big hair seal. The outsides of the bootlegs are painted with red clay which is also used on the backs of reindeer skins dressed for clothing. The regular boot reaches to the head of the fibula but shoes are often worn. By way of ornamentation cut leather designs are sometimes sewed on the boots, strips of white leather or wisps of long reindeer hair are welted into the seams, and the ankle straps may be striped with deer hair. For the winter boots, reindeer skin is preferred. They are made up with the hair out. The tops are often adorned with bits of fur of different colors cleverly pieced together. Inside of the boot a layer of dry grass is placed to protect the foot. In cold weather socks of reindeer fur are also worn.

The coats worn by the women are similar in pattern to those worn by the men but are nearly always made of the breasts of the crested auklet, while the men wear skins of the cormorant, murre, puffin, both crested and least auklet, old squaw, and eider. The last-mentioned are considered too warm by the young men. In summer the women wear close-fitting trunks of hair seal ornamented at the bottoms with the white deer-leg skin and a stripe of dog fur runs up the back of each leg to converge on the seat. The principal winter garment, which may also be worn sometimes in summer, is the *kŏhlŭvŭk* identical with those worn by the women across the channel on the Asiatic coast. This is a baggy, loose-fitting garment of reindeer skin composed of a low V-necked, wide-sleeved shirt combined with knee bloomers. The little girls sometimes wear these the year around.

Newborn babies wear a kŏhlŭvŭk of a different pattern made from the skins of the seagull, feathers in, removed from the bird without splitting the skins. Strands of grass are sometimes welted into the seams to strengthen them. Sleeves and legs are closed at the ends. A whole bird skin serves for each sleeve and leg. Older infants wear similar garments of deerskin with broad standing collars. Sleeves and legs are also closed at the ends, but there may be a transverse slot in each sleeve to permit the putting out of the hand. The child is slipped into this garment from the top as if dropped feet foremost into a sack. Over the head is worn a hood similar in shape, if not in materials and decorations, to those worn by American white children.

Considered from the standpoint of hygiene, the only practical changes which could be suggested would be the addition of easily washable underwear and the use of less clothing in summer. It is a notable fact that travelers in the north find the attire of the Eskimo far more suitable to the climate than that of the white man. The St. Lawrence Islanders are victims of the superstition so common among whites that an excess of clothing is a prophylactic against colds.

Clothing is seldom discarded until entirely worn out and in the meantime it has generally become very dirty. Old trouser legs are often utilized for boot tops, and portions of other discarded clothing come handy for other purposes, for nothing is ever

thrown away which might at any future time be of possible use. New or cast off clothing of the whites is sometimes obtained from passing ships and is proudly worn on pleasant summer days to be quickly laid aside on the approach of bad weather.

In this connection a few observations on means and methods of personal adornment are of interest. Some men and boys crop the hair, but with others the shaven crown or monkish tonsure is the favorite style (Fig. 53, right). This latter style, and also that of the single long tuft on the crown seen in two cases on the island,

FIG. 53.—St. Lawrence Islanders. The name of the girl is Moowhok. The man, Koningok, has the characteristic hair cut.

are distinctive of Siberian influence. With the tonsure a few locks four or five inches in length are sometimes left at the back. The women wear two braids and part the hair in the middle, and a few bang the hair squarely across the forehead. The young women plait strings of beads into the hair, leaving a long free end to each string which is either fastened with a button high up in the braid (probably recently adopted) or is tied into the pierced ear by a leathern string (Fig. 53, left). The older women often keep the hair back with a narrow leather thong tied about the head. For decorative purposes, or for amulets, narrow straps orna mented

with beads, dogs' canine teeth or small ivory carvings are worn by children and adults. Sometimes these are worn about the neck or waist or obliquely over one shoulder. Wrist, ankle and leg straps bearing a bead or two are also worn.

Tattooing with soot is general but far more extensively practised by the women than the men. Because of the painfulness of the process it is not uncommon to see women with unfinished designs on face and arms.

Elaborate designs are tattooed on the cheeks and arms of many of the women. Two slightly diverging lines run from high up on the forehead down over the full length of the nose. A series of broken lines running, some horizontally and others vertically, across the chin are seen on many. A longitudinally divided pattern composed of bilaterally asymmetric designs is often tattooed on the back of the hand and the wrist, occasionally reaching above the elbow. Two women each had a small crudely made human figure on each side of the forehead near the hair. A similar marking was also noted on one man. That much of the tattooing has a certain symbolism about it was learned, although part of it was put on with no other idea than that of ornamentation. Part of the latter was the work of children crudely done upon themselves. A young man is marked with two small dots near together at each shoulder, wrist and elbow, the cervico-dorsal and lumbo-sacral articulations and at the knee and ankle (the hips being represented by the lumbo-sacral tattooing) after first acting as pallbearer, striking a whale or killing a polar bear, all important events in his life. After having been once so marked he *may* never be re-marked even if subsequent events entitle him to this distinction. An old man was marked with the familiar triangular-bodied figure of a man at the cervico-dorsal articulation. Inquiries elicited the information that this was put on after he had been saved by a friend from death on a floating cake of ice. A tripartite figure of symmetrical design was tattooed near the "anatomical snuff-box" in several young men. This was afterward discovered to be a conventionalized "whale tail," a symbol of good luck, which the writer believes to be the origin of some of the designs on the arms of the Eskimo women of which apparently this is the elementary figure.

A line passing obliquely downward and outward from each angle of the mouth was noted in one young man. There is probably a symbolism connected with these lines, for ones similarly placed are painted with a graphite and saliva paint in the ceremony known as É'vĭūk.

Dwellings

The St. Lawrence Islanders formerly lived in houses which they called "ningloos," the driftwood floors of which were four or five feet below the surface of the ground. These were one room structures from twelve to twenty-five feet across, approximately square and approached by a long, narrow underground passageway about twenty-five feet in length. These underground tunnels were so low of roof that one must stoop or go on all fours to enter the living room. The outer entrance to the passageway was, if not placed on a sidehill, protected from the drifting snows by a small shed built of poles, standing upright, and to enter the passageway one must let himself down through a hole in the floor of this shed. The walls of the passageway and living room were most often of driftwood, though at times they were rip-rapped with stones or walrus skulls. Four upright posts of wood or bones of the whale placed in a quadrangle supported the roof of wood and sod, in the center of which was a smokehole or ventilator, covered, when not in use, by the scapula of a whale. On one or two, occasionally three, sides of the room were constructed sleeping platforms or bunks raised about a foot above the level of the floor. These were six or eight feet wide and varied in length according to the number of persons they were intended to accommodate. Sometimes there were two bunks on the same side of the room, one placed above the other. In a few ningloos sleeping rooms were excavated underneath the floors of the living rooms.

At present the people of St. Lawrence live in houses built entirely above ground (Fig. 54, *a*) and in form closely related to the Chukchee dwellings except that the latter generally have side walls built of hides or sometimes of earth. Commonly the house is constructed in the form of an oblong octagon, the walls being made

a

b

c

FIG. 54.—St. Lawrence Island houses: *a*. Winter house. Okonoli, the oldest inhabitant, leaning on a cane; *b*. A "broken house." Womkon (Deceiver) standing in foreground. *c*. Oghoolki's summer house and storage rack. Walrus meat drying on poles. A "lumber house" in the background.

by standing slabs of driftwood about seven feet long up on end and chinking the cracks with moss and wood. Two upright posts support a short ridgepole which runs longitudinally and is much nearer the front than the rear of the house, while in the larger houses shorter posts are ranged about these in quadrangular form to furnish further support for the roof. The ridgepole is not used in the construction of the smaller houses. The rafters are either tied to the ridgepole or clustered well forward of the middle of the roof and bound together with walrus hide thongs. The upper ends of the rafters are allowed to project a foot and a half or more above the roof which is covered with walrus hides, tightly stretched and held in place by bones, driftwood poles, old ship fittings and stones tied to their edges or to thongs passing over the roof. As these houses have no windows, new walrus hides are preferred for the roofs as they transmit the light more perfectly than do the old ones. There is one small door in the end of the house facing the sea, the sill of which is about two feet above ground to prevent the snow from obstructing the entrance. The water-washed gravel of the sandspit is the floor.

A living room or "ogrut" is constructed inside of the house and in this they sleep, and in cold weather spend the greater part of their waking hours. These are seven or eight feet wide and from ten to eighteen feet in length. Walrus hides stretched over poles form the back and end walls and the flat roof of the ogrut, the ceiling being about six feet above the floor. Over all a thick layer of dried grass is fastened to help retain the heat. On the floor is spread a large walrus hide from which the hair has been removed and on the ground running the full length of the ogrut in front is a pole of driftwood which serves the double function of sill and pillow. Across the front of this room is suspended a curtain of reindeer skins with the fur side out. Near the top of this are one or two small holes five or six inches in diameter which serve as ventilators on those rare occasions when they are not covered. As these are the only openings in the curtain, to enter the ogrut one must lift the curtain and crawl under. Once inside, all remove their clothing, for the temperature ranges from 80° to 100° Fahrenheit and with the heavy clothing of the Eskimo this would be

unbearable. In the ogrut the older members of the family generally wear a loin cloth, or trunks made of deerskin, but the children go as naked as on the day they were born.

Of the furnishings about an Eskimo home little can be said, for they are very simple. In the outer room may be found all sorts of buckets, kettles, tubs and trays, some of native manufacture, others obtained from the traders. These are in a decidedly filthy and malodorous condition and are often heaped high with the flesh and entrails of seal or walrus. One or two small packing boxes, or in some cases an ordinary trunk, serve for the storage of all sorts of things from clothing and fishing tackle to tobacco, tea and ship biscuit. Clothing, bits of fur, amulets, ornaments and all sorts of things are stored in "Eskimo trunks," each made of the whole skin of a seal removed after splitting transversely between the fore flippers. On pegs driven into the walls are hung dog harness, coils of walrus and sealskin ropes, guns and harpoons, while littered about is all sorts of junk, for the Eskimo hoards everything against the day when it may be of some use. I have noticed that many whites in the far North, where contingencies of all sorts may arise, also readily fall into the same habit of accumulating that which would be consigned to the rubbish heap in this part of the world. In the ogrut the articles of furniture are few indeed. At the back and ends are placed large platter-shaped lamps which furnish the heat and light. These are filled with blubber with dried moss for wicks. This burns with a clear, steady, intensely hot and smokeless flame and furnishes a light which is soft and agreeable to the eyes. Over one of the lamps may hang a boot dryer with a cooking pot suspended from it or against the ceiling may be a frame with a skin stretched in it to dry. There are no tables or chairs for they need neither.

During the month of July many of the families move into summer houses which they occupy until the latter part of September. The winter homes, just described, are "broken," that is, the ogruts are taken down and the roof is removed (Fig. 54, *b*). The summer house is constructed from the rafters and walrus hides which composed the roof of the winter house. The summer house is much smaller than the one occupied during the winter; it

has perpendicular walls and a shed roof made by stretching walrus hides or pieces of old sailcloth over a framework of poles (Fig. 54, *c*). Inside of the house one or two small sleeping tents or ogruts are made from deerskins sewed together and suspended from the rafters by rawhide thongs. These are often folded back out of the way during the day for the summer ogrut is used but little for other than a sleeping room. The summer ogrut is made with the fur inside. A few of the islanders have tents of canvas which they have procured from the traders. In these they live during the summer making a small sleeping tent inside. A few of the natives have frame houses, very simply but substantially built with double floors and walls interlined with building paper, but they move into the native houses built of hides and driftwood as soon as cold weather begins. The height of a man's ambition is to have a "lumber house" but as building material brought in by traders is very expensive, costing at least three times what it does in the states, it is needless to say that few of them have frame dwellings.

The houses are all built facing the west as the entrance is then protected from the severe easterly and northeasterly winds. Sanitary conditions are far from what they should be but in many ways are as good as possible under the existing conditions, some of which will probably never be changed. That the air becomes unspeakably foul in the ogruts can readily be imagined but in that part of the world, where fuel is so scarce and the cold so bitter, this condition is largely unavoidable. When the raw cold winds blow out of the Arctic, heat is the first consideration and little thought is given to ventilation. The foulness of the air is increased by the ammonia arising from the urine tubs and hides in process of tanning, which at times seems to irritate the eyes, if not the nostrils. To remove the hair from hides they are dampened with urine and rolled up in the warm ogruts for a few days. The resulting fermentation readily loosens the hair but the effect on the atmosphere is bad indeed. Pups are raised in the house that they may have better care and sometimes the old dogs are allowed inside.

There is, in most of the houses, no provision whatever for privacy. The calls of nature are generally answered without thought of the presence of others. Refuse and trash of all sorts, carcasses of dogs, spoiled food or worn out clothing are thrown into the holes where old ningloos formerly stood, or an old meat cellar which has outlived its day of usefulness is used for the same purpose. The long periods of intense cold undoubtedly mitigate the evils ordinarily attendant upon such a procedure. Taking the general conditions about the villages they cannot be called bad, judged by the standards of that part of the world, and the village of Sēēvuookôk was in 1912 one of the best kept in Alaska. It was upon a broad sandspit which not only made a very clean floor for the dwellings but furnished excellent drainage as well, neither of which is true of the old cave-like ningloos, often built in ground which was never thoroughly dry. There are two or three of the frame buildings occupied by native families during the summer which would compare favorably in neatness with homes of the whites in this part of the world. This leads one to believe that perhaps some of the dirt and disorder about many of the homes would disappear if it were not next to impossible for it to be otherwise, considering the circumstances under which they live. Ungwiluk's home had a "Please-you-wipe-your-feet" sign scrawled upon the door and, while but few of those who entered could read, all had been made to understand and heed. In the native houses, while dependent chiefly upon blubber and driftwood for fuel, it will be impossible materially to improve hygienic conditions about their homes. Experience has proven that in decent dwellings the St. Lawrence Islander readily responds to this improved factor in his environment. And while the barbarian of the North has long been notorious for filth, still when the unavoidably cramped quarters, the necessary frequent preparation of greasy and bloody meats and hides, the difficulties attendant upon bathing, the nature of the clothing and the lack of sanitary facilities generally are considered, one is led to believe that civilized man might not do much better in such an environment. And nowhere on earth could it be more forcibly impressed upon the observer than in the stern and barren North that man

is most certainly in large measure a product of his environment.

Food

Needless to say, in a climate so inhospitable as that of St. Lawrence Island the vegetable portion of the diet is almost negligible as compared with the quantity of meat consumed.

The seal and walrus take first place in their fare. These and other meats are stored in the *suclō'uk* or blubber cellar where, so the writer was informed, even through the warmest season of the year, it can be preserved in good condition for a period of three months. But it might be stated here that what these people consider "good condition," would fall far short of our standards. One of these meat cellars was visited and a description of what was seen may help to make clear the inadequacy of present methods of food storage. No attempt will be made to describe the awful odors which often arise from these places and pollute the atmosphere for a quarter of a mile to leeward when they are first opened.

Early one morning a woman was seen going to her suclō'uk with a small wooden tub on her shoulder to procure a supply of meat. Having been curious to learn what one of these places was like I hastened after her. Arriving at the cellar, I called down to the woman, who was already at work, and then let myself down through a hole about twenty inches in diameter into the cellar, my feet touching bottom about four feet below. After becoming accustomed to the darkness I looked about and discovered that I was standing on a narrow dike of earth about a foot wide which was near the center of a figure-of-eight shaped room approximately fifteen feet in length. The walls were rip-rapped with walrus skulls and blocks of stone which were damp, greasy and covered with mould. Overhead, the sod roof was supported by whale bones laid across from wall to wall. Where I was standing the side walls were about three feet apart but diverged toward either end of the cellar. In what might be termed the two compartments of the cellar the floors were lower by at least a foot than the dike in the center. To the right was a pool which covered the whole floor of that compartment with stagnant water on

which was floating a heavy layer of oil. Lying in the water were what appeared to be two pokes of blubber. To the left, the floor was covered with large chunks of meat which appeared to have been wrapped with skins but which were so foul with slime and mould that no attempt was made to verify appearances. Upon a couple of these stood the woman with both sleeves rolled up to her shoulders. She grinned at me good-naturedly, much amused at my curiosity, and went on with her occupation of fishing the day's rations from out of one of two casks of seal oil which stood at the end of the suclō′uk. Simultaneously becoming aware of a new and more foul odor and a soft gurgling, hissing noise I discovered that the woman had stuck one heel through the surface of a chunk of meat (apparently the carcass of a small seal) upon which she was standing and the escaping gas was what I heard and smelled. She again grinned at me and chuckled at my discomfiture but seemed to have no personal concern about the malodorous mass beneath her. After a hasty survey of the situation, I called back "good bye" as I quickly retreated through the hole in the roof.

But the St. Lawrence Islander prefers the wholesome fresh meat to that in which decomposition has begun and has learned by dear experience that many of his severe digestive disturbances can be traced to the consumption of decaying meat. However, his game may get very high before it becomes at all objectionable to his tastes.

The flesh of the walrus is consumed in large quantities. Much of it is cut into strips and hung across poles to dry in the open air. This jerked meat is eaten both raw and cooked.

During a successful whaling season large quantities of whale meat are consumed and some is stored for future use, to be eaten both cooked and raw. Portions of the extremities of the whale's flukes are saved to be eaten at the celebration of *Kamuk'tock* and the thicker central part of the flukes is used at sacrificing time. The whale "gum" is considered a great delicacy and is held to be sacred food by the hunter who struck the whale.

Probably all have eaten dog but, except in seasons of scarcity, the dog is more valuable alive than dead.

Birds, which are very plentiful during the summer, are an important and very palatable part of the diet. These are generally eaten soon after they are caught but occasionally are preserved after cleaning by dropping them into barrels of oil where they remain until desired for use. Fish and other meats may also occasionally be preserved by the same method. Salt is not used as a preservative, neither is it popular as a seasoning.

The crested auklet in the summer and the Pacific eider in the fall are probably eaten in greater quantities than other birds though the sea gull, cormorant, puffin and murre are also eaten. Much relished as articles of food, when roasted, are newly hatched birds, which are extracted from crevices in the rocks by means of long sticks with sharp hooks attached to one end. Of the fish used, the principal ones are the cod and tomcod, sculpin and salmon, many of the latter being caught in the river near the reindeer camp. Crabs, many of which are caught in the spring, are also used. Reindeer meat is liked and eaten when available but cannot be considered an important article of diet, even at the reindeer camp.

Their culinary art has not been developed to a very high standard of perfection and the average white person would not only consider most of their viands unpalatable but in some instances decidedly disgusting. Yet it is surprising, in the case of foods as with many other things, how familiarity with them will alter one's viewpoint. Meats of all sorts are sometimes eaten raw but the usual method of preparation is by boiling, sometimes along with a little seasoning. Several varieties of seaweed, including kelp, are gathered on the beach. These are dried to be cooked later with meat, making a thick stew. Birds' feet are sometimes dried and hung about the house in long strings to be eaten in the winter if food becomes scarce.

The vegetable diet, in addition to the seaweeds and kelp just mentioned, consists chiefly of the leaves of plants and a few small roots, eaten both cooked and raw. Vegetable foods, obtainable only in limited amount and variety, are greatly relished, the taste for them at times apparently amounting to an actual craving. The writer has seen Eskimos pounce upon a little patch of small

tasteless berries which grow upon the island, seeming unable to pick and eat rapidly enough to satisfy their appetites. *Nūnē'vŭk* is a small plant, the leaves of which are gathered and ground, mixed with water, and allowed to ferment. Ahslit is made by adding seal blood and cooking the mixture. Nūnē'vŭk, fermented, frozen and ground, is sometimes mixed with snow and blubber. The plom'uktuk (plomuktut, plural) thus made is considered quite a delicacy. The leaves of a plant called *kōkōng'ŭt* are also ground and mixed with seal blood in summer or blubber in winter. Kōkōng'ŭt leaves are sometimes steeped to make a beverage which is quite popular when tea is scarce.

Most of the "white man grub" such as beans, rice, dried fruits (especially raisins and dates), canned beef, sweets and preserves are relished and eaten whenever obtainable. During the summer of 1912 a trading schooner arrived with a few apples, lemons, and oranges for which they readily gave many of their hoarded treasures. Some are very fond of onions. Cheese and ice cream were eaten "with long teeth." The sweetened condensed milk is relished by old and young, and infants are often fed upon it when it is to be had, but they do not like the evaporated, unsweetened milk. In some families, especially where there are small children, bread is becoming an important article of diet. For the children, they want such food as is eaten by the whites whenever they can get it and for themselves, when ill, the first wish is for white man's food. Pilot bread is always in great demand. A few of the women have learned to make baking powder bread which is baked on both sides in large flat loaves after which it is turned out on the floor to cool. "Mazinka" bread is also made here by mixing a dough of flour, water and baking powder, and frying large flat chunks of it in hot seal oil after the manner of frying doughnuts. After one becomes accustomed to the strong odor and taste of the oil this is a fairly palatable bread. As yet most of them have not learned the use of corn meal and other of the coarser and more nutritious flours.

They drink large quantities of snow and ice water even when the most excellent lake water is easily obtainable. Tea is the favorite beverage. Large kettlefuls of it are made and some

of them drink it by the quart. They appreciate and prefer good tea but drink anything that is tea. The English Breakfast is the popular tea but, when this or something better is not obtainable, they use the "tchi" or Russian brick, a very inferior grade obtained in trade from the Siberian natives. Tea is often boiled until it is red, strong and very astringent and drunk without milk, as they nibble at a cube of sugar or hold one in the mouth. A few drink coffee but tea is preferred.

At meal time, which is fixed by the inclinations of the family rather than by the clock, a large wooden trencher, sometimes three or four feet in length and about a fourth as wide, is placed upon the floor and around this the diners sit crosslegged. A woman at one end of the tray cuts the meat into small bits with a mincing knife and scatters it in little heaps over the tray that it may be convenient to all. Each helps himself with his fingers. When they have finished a bowl of water is passed by a woman in which each rinses his fingers, wiping off his lips with them while still wet. The fingers are then dried on a towel or a wad of soft dried moss or grass sewed together with grass. Then the tea is passed and, if bread is to be had, it is eaten with it. Often when lunching alone a strip of dried walrus or other meat is held by one end in the teeth while a knife, wielded dangerously near the nose, is used to cut off each bite.

In this connection the story of the great famine of 1879–1880, as told to me by Oghoolki, one of the old men of the island, is of interest. He knew little of the famine in other places beside Sēēvŭookôk (now Gambell) but probably what he said of this place will hold true in a general way of the other villages although of the others there are now no survivors to tell the tale.

During the summer a large quantity of whiskey was obtained from some ships which came to the island, and there was little hunting done because the men were drunk a great deal of the time. During October they began to suffer for food, and were able to procure very little until the following April. The younger boys did not drink much whiskey and they did what little hunting they could. The people became like hungry dogs and cared for nothing but food. If a man returned to the village with a seal after a hard

day's hunt all would rush at him and take it from him. When food became scarce a few of the strongest men walked to South West Cape and traded whiskey for food.

A man came to visit the village from a place the other side of Kukulik and in the night someone killed his dogs and ate them and he was unable to return home that winter. No one thought or cared for anything but food and they would fight and scuffle over a bit of meat not even caring if they were killed in getting it.

Oghoolki drank no whiskey and he and his brother used to trap foxes and were able to ward off starvation by eating this meat. Before getting too weak to walk he went to South West Cape and traded his coat for food, which apparently did not become scarce there until later in the winter.

The stronger men went to hunt out on the ice and some of them were so weak they were unable to return but dropped on the ice and died there from cold and exhaustion. Sometimes a seal or walrus would be killed and in their hurry to get some of it to eat men would fall into the water and drown. Boots and dog-harness were eaten, while the walrus hides they removed from the roofs of the houses, and the raincoats made from the dried intestines of the seal and walrus were cooked and eaten also.

All became "so thin that they seemed to have no bellies" at all. If a hunter should get any game he was able to bring home only a small part of it because in his weakened condition he could not carry heavy loads as they ordinarily do. There were very few deaths until spring when food was more plentiful and easier to get. A man came in one day and said he had killed two walruses. A little was given to every family, but as all began to get enough to eat they gorged themselves, for "while their bellies were full their mouths were always hungry." Being too weak to assimilate such quantities of food, deaths followed rapidly from acute indigestion. In their weakened condition they were unable to take the dead to the cemetery so that many of them were merely dragged outside or even left in the houses.

When I asked if any of them became so hungry that the children were eaten I received an emphatic "nucka" (no). My informant then told me that a white whaler who visited the island

the following spring had asked him why they hadn't eaten some of the women, and told him that "woman was good food." Oghoolki's comment was that the whaler was a very bad man. He said that for many years after the famine the people were very careful to have a good supply of food stored for winter, but in the last few years they were forgetting and becoming careless.

There is a story current among them that at one time food was so scarce that when a walrus was killed on the ice the hunters would take off their mittens and, rolling them in the blood, would soon have a large ball of frozen blood to take home. I heard this story several times but it is apparently a tradition relating to times when the island was thickly populated, long before the famine of 1879–1880.

Occupations

Along with food, clothing and shelter, the occupations of a people determine to a considerable degree their physical development and welfare. The St. Lawrence Islander is very versatile. He is not only a good hunter and a clever trapper; considerable mechanical skill is shown by his work in ivory and iron. It is the writer's opinion that in the use of the gun his marksmanship would hardly equal that of the white man who had had a similar amount of practice but in trapping birds and such four-footed game as the island affords he displays exceptional ingenuity. He has invented quite a variety of traps for catching birds. Large open nooses made from shreds of baleen are used in various ways and are quite effective. Some of these are fastened to the rocks, others are baited and partly buried in the sand while still another form consists of a yam-shaped weight of walrus hide filled with clay, and to this are attached three large loops of whalebone and a long rawhide thong. This is thrown into a flock of birds on the wing and is quite effective when skilfully used. A large hoop-net attached to a pole about fifteen feet in length is used to catch birds in much the same manner as we would use a butterfly net. The birds are sometimes tied through the nostrils to a long line and fastened across a rock, the row of live birds acting as a decoy for more of their kindred. When the hunter is ready to depart for

home the birds are killed, generally by biting in the back. The bird bolas, with five to seven large walrus teeth or bits of ivory as weights, is also used. Since the advent of the shotgun these methods are not practised to the same extent as formerly. Modern steel traps are used by many of them to catch the foxes and squirrels which abound on the island but traps of native make, working on the principle of the twisted thong or the bent whalebone spring are also employed. The younger generation are not good seamen and cannot be persuaded to venture upon the sea except in the very calmest of weather. They catch a great many fish with the modern hook and line or ivory hooks with bits of the red skin from duck feet sewed over them for bait. Several of these are fastened to a line of scraped whalebone.

Whales are caught by harpooning and tying inflated pokes to the harpoon lines to impede the swimming and prevent the whale from diving. It is then killed with a bomb from the darting gun or the shoulder gun. Until a few years ago the whale was killed with the lance. This was composed of a flat, slate head, sharpened on a stone and the edge hardened with oil, fastened to a pole about fifteen feet in length. The whale was struck just back of the flipper. In pleasant weather during the summer several boat crews go in company to bring back driftwood for summer fuel and to make sleds and canoe frames or repair the houses.

As a carver of ivory the St. Lawrence Islander often displays considerable skill and artistic ability together with an exceptional sense of symmetry. He cannot execute, or rather he has not hitherto executed, any work like that of the King Islander and some of the natives on the mainland, but it is probable that this is not from lack of ability so much as lack of opportunity to get suggestions from the whites, which is largely responsible for the high development of the ivory-carving industry in some parts of Alaska. The writer has seen some very handsome paper weights, letter openers, drawer pulls and door latches which were made by the St. Lawrence natives.

A few Eskimo are engaged in reindeer herding at Camp Collier, to the eastward of Sēēvuookôk, but as a general thing this way of gaining a livelihood does not appear very attractive to these

people. The mechanical ability of the natives is well shown by the skill with which they fashion bits of scrap iron, old files, broken saw-blades, etc. into spear points, skates, and cutting tools of all sorts, some of which, in both design and temper, would do credit to the average white mechanic.

In carrying heavy burdens they are quite remarkable. A rawhide thong is laid double upon the ground and the load placed across it with the two free ends of the thong in front. The doubled portion of the thong is drawn across the top of the load and the burden-bearer sits on the ground pulling this over his head while the free ends are brought up, one under each arm, and caught through the loop in front of the chest. The free ends are grasped with one hand and the bearer is either helped to his feet or turns over on all fours and rises without assistance. Both speed and endurance are displayed in the long cross-country trips which are made by the men, walking and running over rocks, loose gravel or marshy tundra, sometimes with heavy loads of game or driftwood on their backs. To be strong is perhaps the highest ambition of the men and with that object constantly before them much time is spent during the pleasant summer days in foot-racing, jumping, and lifting large stones.[3] Near an abandoned village on the north shore of the island are two large cairns built of heavy stones gathered from a space several acres in extent. To build these meant many days of very heavy labor for some man, who did it, so the writer was informed, to develop his muscle and leave a monument to his industry. Near another deserted village, Kukulik, is a trail extending for a considerable distance along the mountain side. It is about a yard wide and, in many places, as much in depth. It runs through an extensive field of large broken boulders and in building the trail hundreds of these were moved at the expense of a great amount of labor and time.

Household duties do not allow the women a great deal of leisure. There is food to prepare, skins to dress and a great amount of sewing to be done, for the woman must make clothes for the entire family. She is very dextrous with the needle, sewing both rapidly and well, pushing her needle toward her with the

[3] More will be said on this subject under "Sports and Amusements."

index finger and using for snow-shirts and raincoats the thread obtained from the traders, but in making coats, boots and other clothing which must stand hard wear, she uses sinew thread of her own spinning. This is made by picking the dried sinew into shreds; these are moistened at the ends with the lips and spun into a strong smooth thread by twisting over the cheek or the back of the hand. In sewing, graphite is sometimes applied to the thread.

The women make the lamps (noneck) by mixing clay and sand with water, moulding into shape and allowing to dry for about three days. They are then baked and painted with seal blood. The sacred gum pots, and formerly pots for cooking food, were made in the same way. Their pottery is not strong and very easily warps, cracks, or crumbles.

That the St. Lawrence women are quite skilled in dressing skins is demonstrated by the beautiful white seal leather and some of the tanned deerskins which they produce. But often they are very careless in dressing them, believing it easier to sew on a patch than to exercise care in the scraping.

Some of them are quite skilled in basketry, making very substantial coil baskets. These are not decorated in any way.

The gathering of leaves and the digging of roots for food devolve upon the women. Sometimes the young men assist in gathering the grass to reinforce the ogrut walls or in getting the moss for lamp wicks. Trading is mostly done by the women.

General Habits

From what could be learned it appears that the time for retiring and rising in the winter months is not unlike our own, but during mid-summer when the only night is a couple of hours of twilight about midnight while the rest of the twenty-four hours is light, their habits are very different. The long pleasant evenings are considered the most enjoyable part of the day and friends visit, hunting and fishing parties remain out, or little groups gather to gossip, seldom returning before midnight or even two or three in the morning, rising at noon or a short while before on the same day. The children often play out until long after their parents have retired for the night. In fact both children and adults appear

to follow their own inclinations in this respect regardless of other members of the family.

Soon after rising, the women prepare the day's provisions, going to the sucl$\bar{o}$′uk for the meat supply, to the lake for water, or to the beach to tap the perennial ice supply which furnishes their favorite drinking water.

The men may be served breakfast before rising, eating with their fingers from a platter placed, in warm weather, just without the ogrut so that only the head and bare shoulders are exposed to the cooler air of the outer room; an early caller, who generally enters unannounced, is sometimes greeted by a row of naked men, women and children, sticking half-way out from under the curtain to converse with their caller who, having his clothes on, may remain in the cooler and more comfortable outer room. In cold weather the caller goes into the ogrut and removes his clothing.

Diurnal time has but little meaning to these people. There is a clock of some sort, procured from the traders, in nearly every home, but the timepieces in the village will be found not to agree by several hours. A clock appears to be only an interesting piece of furniture in the majority of homes, one in which pride is taken much as in the case of a fine piano or a large library in some American dwellings, exhibited with considerable satisfaction but appearing to serve no useful purpose. On the other hand the islanders calculate changes of the moon and the seasons very well indeed.

Bathing takes place at long and uncertain intervals. Those questioned were unable to swim, which is naturally to be expected in a part of the world where one seldom gets into the cold water except by accident.

With the men, life is made up of intermittent periods of indolence and hard labor. On the whole they are rather industrious. The women are busied most of the day with sewing, tanning and the preparation of food. Considerable time is given to sports and ceremonies, and singing and dancing.

During the month of July many of the houses are "broken" and the families remove to some other part of the island where fishing is good or seals are plentiful. The walrus hides and poles

from the roof of the winter house are taken along to build the summer home unless the family should be fortunate enough to possess a tent. In from six to ten weeks the family returns, puts the roof back on the house, sets up the ogrut, cleans out the blubber cellar and places new sod over it to protect it from the severe winter weather, which is soon upon them in all its Arctic fury.

There are few pleasure trips taken unless there is also a prospect of adding to the supply of food or fuel.

Kissing, as we know it, is not a custom among them, but rubbing the sides of the noses together gently is a common and much enjoyed practice between men and women who are attracted to each other, and there have been some fierce fights because some hunter, returning home unexpectedly, discovered his wife rubbing noses with a neighbor. In this connection it is interesting to note that in several cases, more commonly among the men, the skin over the alae of the nose and the adjacent cheek was found very sensitive to a slight touch, i.e. ticklish. This was first discovered in taking the measurements of the nose which in a few instances was not an easy matter because of the dilating and other movements of the nostrils. Afterward the writer experimented on quite a number by tickling gently with the finger tip after the nasal measurements had been taken. While this skin area is very sensitive in an occasional white person it is undoubtedly more so in these people. The fact that tickling is a sexual stimulant is quite generally recognized and it appears that the St. Lawrence Islander has developed a sensitiveness at the side of the nose to a degree not common among American whites. The sexual stimulation resulting from the practice of nose-rubbing is probably due to the action of the physiological law that all skin surfaces near to the junction of skin and mucous membrane are in greater or less degree sexually irritable.

Sports and Amusements

On pleasant days during the summer, as has been said, the men often occupy themselves with sports of various sorts to develop their strength and endurance, for to belong to the aristocracy of

"strong men" is a desirable goal. And in a land where the struggle for existence is so fierce and only the strong survive, where long and arduous hunting and fishing trips are but part of the daily life, where many nights are spent in the open with no protection but the ordinary clothing while wind, fog, rain or snow envelop the outdoor sleeper, and where heavy burdens of game or drift-wood are carried upon the back over loose gravel or marshy tundra, he who is not strong cannot take his place among the even moderately successful members of the community, and many times the difference between strength and weakness means the difference between life and death.

So there is a reason why much time is spent in foot-racing, jumping, wrestling or rock-lifting together with other sports of lesser favor among them, such as tests of strength between two individuals or performing upon a horizontally stretched rope. At Sēēvuookôk there is a track of nearly two miles over the sandspit, and often parties of fifteen to thirty may be seen running upon this track, at a steady gait, each aiding his progress with a running-stick.

Wrestlers strip to the waist. The successful contestant squats upon the ground and waits for a successor to his vanquished rival. Often fifteen or more may take part in an afternoon's bout. Arm-holds predominate and their wrestling is not fraught with the dangers incident to wrestling among us.

Those who excel in wrestling, running and lifting are known as "strong men" and may be identified by the trousers worn, there being a strip of white deer-leg skin around the bottom, and a stripe running up the back of each leg made from the bark-dyed hair of the unborn seal and the long white neck-hair of the reindeer (Fig. 55). Strong men are not expected to die a natural death, but in case of incurable illness are strangled by the use of the *kōmŭl'skhȳē* or strangling pole and a piece of rawhide rope, or if the strong man prefers he is shot or stabbed. These methods of ending the troubles of all incurables—generally at the patient's own request—were formerly quite common.

Dancing and singing are favorite amusements. There are two varieties of dancing practised, the one (probably ceremonial)

which is always danced in the same manner and to the accompaniment of the same tunes, the other of movements and pantomimes invented by the dancer with the sole purpose of entertaining the spectators. The women usually keep both feet planted firmly on the ground, bend the knees to a somewhat squatting posture and then perform a variety of contortions with the trunk and neck and motions with the arms, all the while keeping time to the music. The men pat time with one foot, while the weight of the body is supported on the ball of the other, meantime turning

FIG. 55.—Three strong men. The one at the right end was born in Siberia of Chukchee and Choochow (Koryak) parentage.

from side to side, reaching the arms in various directions, or sometimes injecting into the dance absurd movements of head and arms to the merriment of the onlookers. One very difficult and at the same time very absurd and laugh-provoking movement is to quickly dart the head forward or to one side, keeping the eyes on a level with the horizon. The dancers, usually from one to three at a time, take their positions in front of the orchestra, the members of which sit in a row. At the largest dance attended by the writer the music was furnished by seven young men, one of whom

was supplied with a drum, five with empty five-gallon kerosene tins and heavy sticks, and one with two blocks of wood. The members of the orchestra hammered vigorously upon their instruments in perfect time and unison and occasionally a musician would rise to his feet that he might let fall heavier blows with his stick or drum. With facial muscles drawn tightly, jaws nearly fixed, and throat muscles tense they sang loudly and perspired profusely, while, at more or less regular intervals, the time would quicken and the volume increase as the dancer, perspiration oozing from every pore, twisted, posed and stamped his foot to the accompaniment of the music. When the dancers began to lag in their movements the orchestra ceased, to give them a few moments rest. If one of the performers became too warm he would strip to the waist, but he must never dance without gloves on his hands "because we have always done that way." Dancing is often a very good test of the endurance of the performer and increases materially his muscular development and suppleness.

Nearly everybody is able to dance and sing but many are so bashful that they seldom participate except among members of their own household.

In pleasant midsummer weather the small boys often gather in little knots on the lee side of a dwelling and sing their quaint songs while elsewhere similar groups of men may be seen with arms drawn inside their parkas, gossiping and telling stories. Practically all, both young and old, can sing—and all enjoy it immensely—but they cannot whistle. "Our mouths too stiff" was the reason given by one young man. The writer, who is a very ordinary whistler, has often been surrounded by spellbound groups of Eskimos, sometimes numbering a score or more who were entertained by whistled bits of everything in his repertoire from old hymns and ragtime to Eskimo tunes. Within a few weeks some of them were beginning to whistle, much as would the American small boy.

During pleasant weather all spend much time in the open, enjoying the fresh air. The women go outside to do cooking and sewing when the weather will permit, and it will permit these

northern women to sew out of doors at temperatures which would cause the average white woman's fingers to stiffen with cold.

There are several outdoor games of various sorts which are participated in by the boys and young men but space will not permit a description of them here.

Marriage

Marriage conditions have probably been considerably changed from what they were when the island was more populous and there was a closer approach to equality in numbers between the sexes. It is probable that the wishes of the young people are more respected now than formerly, due, in the main, to white influences.

At present the girls usually marry soon after puberty, though there were several unmarried girls between the ages of 16 and 21 when the writer was on the island. However, with one possible exception, these were engaged at the time. There was one unmarried woman past thirty, but as she had the well-deserved reputation of being a shrew, it is not improbable that she will remain unmarried throughout life. Among the men, marriage usually takes place at about the same age as with ourselves, but the males would probably marry at an earlier age were it not for the fact that there are more of them than of the females. A young man of about thirty told me he hoped to be able to make a trip to King Island soon to get a wife. There are two men who have two wives each and formerly, when there was less disproportion between the sexes, polygamy was common, as it is today among their close kin who live across the channel at Indian Point, Siberia —one man there being the possessor of six wives. After the death of a married man, his brother is expected to marry the widow and care for the family. In marriages of this sort, there is often marked disparity in the ages of the husband and wife. Marriages are usually arranged by the fathers of the young people, the boy's father calling upon the girl's, taking with him a substantial present. If all is satisfactory the young man goes to live at the girl's home and works for her father, usually for a year, but sometimes much longer. If at the end of his probation he is considered a desirable son-in-law, he is allowed to take the young

woman to his home and she becomes his wife. The writer could learn of no marriage ceremony. On the other hand, if the young man is not pleasing in the eyes of the girl's father he must return to his home without either wife or compensation for his one, two or three years' labor. A widow often becomes the wife of a man, who may or may not be married already, simply by going to his home to live at his invitation. This also applies to a girl who has been left an orphan. It was formerly an occasional practice for a man to steal the wife of someone in a neighboring village. Furious fights often resulted between the two men because of it, and at times their respective villages were involved in bitter wars. It is said that the woman usually preferred to go with the victor.

The women are generally well treated. In the few cases where husband and wife cannot agree a separation results. The writer learned of two such, in one of which the huband was an orphan and hence became homeless, and for this reason the woman and her father ultimately permitted him to return. Generally speaking, family dissensions have about the same origin as among ourselves, though the various factors are not active in the same degree. Chief among them might be mentioned meddlesome parents, failure to provide for the family, sterility and sexual incompatibility, and jealousies, which seldom arise without good and sufficient cause. In their folklore, in regard to which the writer gathered much interesting information, and which depicts "the doings of our grandfathers" and reflects in a great measure the general habits of thought of these people, one often meets tales of liaisons and of quarrels between husband and wife or between a man's two wives. The marriage tie is, however, fully as stable as among the whites and probably more so.

Mortuary Customs

When a death occurs the deceased is bathed from foot to head by an old female relative. He is then dressed in his best deerskin clothing, put on wrong side, i.e. fur side, out, then wrapped in deerskins which are held in place by a rawhide rope bound about the body from head to foot in a series of half-hitches. A stick of wood about the length of the body is then slipped under the rope

along the front of the corpse. Eight pieces of rawhide rope, with a loop for a handhold in the end of each, are then tied to the binding cord to serve as handles for the eight pallbearers.

The members of the deceased's family turn their clothing wrong side out and sprigs of mint are bound under their noses by two stems of grass passed under the ears and tied at the occiput.[4]

Formerly when a death occurred in the village all children, except those belonging to the family of the deceased, were painted on their faces with a red paint-rock brought from Siberia. A short mark was made above each eyebrow and a large half-circle with the middle portion extending across the forehead and the extremities down over the cheeks, a short mark extended diagonally downward and outward from each corner of the mouth and was painted on each cheek. This was done to keep death away and was a custom of Siberian origin.

Part of the personal effects of the dead are broken at the home or at the village limits while part are carried to the grave and left there.

When the corpse is removed from the house strands of grass, made by knotting three pieces end to end, are tied to that part of the binding cord which is about the neck while the free ends are passed up over the face. The body is carried feet forward to the edge of the village where it is laid upon the ground. The relatives then cut the strands of grass to signify that all ties between them and the dead have been severed. Then the body is dragged to the graveyard by the eight pallbearers. They are accompanied only by an old man, or by an old woman if the corpse is that of a woman, whose duty it is to undress the body at the grave where it is left entirely nude.

In winter the corpse is left upon the snow but in summer it is laid out upon the ground and a ring of stones in the form of an ellipse is placed about it. One grave in an old cemetery was examined where the dirt and stones had been scooped out leaving a shallow pit in which the body was deposited and then covered with stones. It is the writer's belief that this practice was formerly quite common.

[4] Knud Rasmussen, in writing of the Greenland Eskimos, says: "The left nostril is plugged with straw when any one dies, this is done to secure a long life. The nostril only remains plugged as long as the funeral ceremonies are going on."

At the grave the ropes are severed, the clothing and deerskins cut into shreds and all are scattered about on the ground. There, also, the things used by the person during his illness are broken. Implements used in hunting and fishing, and the toys of children, are left at the grave. A bead or two, a bear's tooth, or a weight of an old bolas worn by the deceased to prevent sickness are left at the grave and sometimes placed under the headstone, or, if the corpse is that of a woman, her mincing knife. Ivory harpoon and arrow heads, deer-horn spoons and ivory ice picks were formerly often placed under the footstone, but this practice is not so common today.[5]

The pole which was used on the corpse, to keep it in a fixed position while being dragged to the grave, is placed with one end under the footstone, and a foot or more back of this another stone is laid beneath the pole so that it does not lie flat upon the ground but points upward at an angle. With this pole they often placed a spear, a canoe paddle, or, in those cases in which the deceased met death by strangulation, the gallows-stick or komilschye.

After the ceremonies at the grave, which often differ somewhat in detail, the pallbearers return to the home of the bereaved family where a fire of kindlings is made in front of the house. Each of the pallbearers then places his feet alternately in the blaze for a moment, probably to purify himself, after which the head of the household brings the piece of rawhide rope, of which part had been used to bind up the corpse. A piece of this a foot and a half or two feet in length is given to each of the pallbearers who, immediately upon his return home, ties it to one of the supporting posts of his storage rack. The subsequent tattooing of the pallbearer has already been mentioned.

The members of the family now take off the mint which was bound under their noses, but they do not leave the house for five days nor remove their hoods except in the ogrut.[6]

[5] Deer horns were often placed at the graves of Indian Point natives who died on the island.

[6] In pleasant weather or in the house the hood is generally slipped back off of the head.

Among the Greenland Eskimos "the persons who have had to do with the corpse must remain quiet in tent or house for five days and nights. . . . They must not take

After five days the family visit the grave to view the remains and learn what animal has been eating the corpse, for the St. Lawrence Eskimo believes that in the next life—he expects to have five in all—he will become that animal which first eats him.

Upon the return of the family to their home the clothing is again turned right side out but they continue to keep the hoods upon their heads for another five days.

As a sign of mourning both men and women sometimes wear a bead in the front hair. A strand of the hair is pulled through the bead and tied.

Mental and Moral Characteristics

Our impressions of other races are controlled largely by the circumstances under which we are thrown in contact with them or by the fact that we judge all by the few individuals with whom we have been most closely associated. And again, to the white man they often reflect those traits which have characterized the civilized men with whom they have come in contact, and these of course tend to obscure their real character. Many observers approach a people strongly imbued with their own ideas of right and wrong and firm in the belief that the present standards of civilization are the ideal of perfection and suitable to all races and environments. In consequence they unconsciously radiate a spirit of criticism which is readily detected and closes the door effectually to an insight into the true character of a people. Others in turn lack the imaginative powers and sympathy necessary to approach, in the least degree, the viewpoint of the other man; they may know, but do not seem fully to realize, that the other race is actuated by much the same necessities, desires, ambitions and emotions as their own. The writer makes no claim to having altogether risen above the imperfections noted, but he has attempted to do so. Attention is called to them, not to criticize other observers, but that the reader may take cognizance of the fact and make due allowance for the personality of the observer,

off their clothes at night or pull back their fur hoods. . . . On the five days following upon the burial, at sunrise and sunset, they must go up together to the grave and go once around it in the same direction as that of the sun's circuit of the heavens." (Knud Rasmussen.)

and the writer finds that his impressions of these people differ in some respects from those of others who have come in contact with these and other Northern tribes from time to time.

The St. Lawrence Islander is of a cheerful, sunny disposition which seems remarkable when we consider his comfortless home and the nature of his telluric environment. He is jolly and quite given to good-natured teasing and banter wherein he can both give and take with zest, but rebuke or ridicule he cannot stand. He cannot be termed lazy, but he will not drive himself to do labor in which he takes no interest, as the white man often does. While hunting, fishing, trapping or gathering driftwood, his labor is frequently very arduous and he endures many hardships. He is friendly and sociable, visits and is visited a great deal. In pleasant weather, both day and night, may be seen little groups on the lee side of the houses, visiting, telling stories or singing their drum songs. Hospitality in the home is freely given and expected in return. As a rule the St. Lawrence Islander is improvident but there are many exceptions to this which will bring the average somewhere near that of our own race. It is the writer's belief that the improvidence of the Northern native has been somewhat exaggerated, because the often dire consequences of it bring it so forcibly to our attention. If he were as improvident as we are often led to believe, the race would have been extinct before its discovery by the white man. His environment will not permit of it. Generally speaking he is an ingrate; regardless of past favors he will demand pay for the least service he may perform and will freely impose upon one's good nature to the limit, but he seems to feel no resentment if an emphatic stop is put to his impositions. However, it appears that this applies only to his intercourse with the whites, is a natural result of his past relations with them, and cannot necessarily be called a racial trait. Altruism being one of the latest and rarest acquirements of our own race we cannot expect it and do not find it in much evidence among these people. Patience and care are characteristic of the St. Lawrence Islander.

Timidity is a common trait of the children and young women; this also applies to some of the young men. The children get along well together, spending much time in one another's company, play-

ing their simple little games or singing their songs. Only once during the writer's stay on the island was a children's quarrel seen, a record which he never expects to see equalled in a white community where a like number of children are as much thrown together.

Honesty in its various phases is not all that might be desired, yet conditions are not bad, and on the whole I believe the passing generation is superior in this respect to the younger one. With a few exceptions they are truthful, theft is not common, and other than that of a little candy and a fountain pen no cases were brought to my attention while on the island; the pen, and probably the candy, was taken by a child. Among themselves the property rights of others are generally scrupulously respected. On the other hand a promise means absolutely nothing to any of them. A St. Lawrence Islander may keep a promise if it will in no way inconvenience him to do so, but not otherwise. This was found to be one of the greatest and most constant sources of annoyance while working among them.

The St. Lawrence Islander is very fond of his family. He spares the rod, but this does not seem to spoil the child. The older members of the family, especially fathers and older uncles, are treated with extreme reverence and respect, accorded them because of their age and the wisdom garnered from years of experience. To make a request of an old man is not common, to give him advice, the height of impertinence, and to command him unthinkable.

Generally speaking the native loves his wife and treats her well, but in some cases it may be his neighbor's wife whom he loves and he often sees no reason for concealing the fact. The sexual life of these people at first strikes one as extremely loose, but on further consideration the writer is inclined to temper his judgment considerably in this matter. Initial impressions will invariably give one an exaggerated opinion of the extent of their immorality. Belonging to a "natural" race free from the restraining influences caused by fear of social ostracism or the condemnation of public opinion, and with ideas of modesty and

propriety different from our own, the St. Lawrence Islander makes no great effort to conceal his sexual life. The civilized white observer often passes judgment upon the uncivilized after comparing only the *manifest* immorality of the two races, apparently innocent of the true condition among his own people. These Eskimo are on the average not so far below our own race in morality as in the matter of concealment. While the percentage of immorality among them is greater perhaps than with us, still an unbiased comparison would give us a better opinion of these people than one would get from the few published references to them. Marriages are sometimes based on mutual attraction, sometimes not, but it may develop later; in any case, necessity is the greatest factor. A man must have some one to make his clothing and prepare his food, he must have children to care for him when he grows old. Marriages are arranged by the parents, at times with due regard to the wishes of the young people, at others directly contrary to the wishes of each; in the latter case especially the matrimonial sea is often troubled. As in some other Arctic and sub-Arctic communities there is an excess of marriageable males over females. The young men and women are not allowed to associate so freely as among ourselves—there are no long walks or picnic parties—but nevertheless love affairs spring up between them. Some have learned to write and little brothers are often seen scurrying back and forth with letters written by lovesick boys and girls. Hot blood runs in the veins of these Northern folk and loves, jealousies, disappointments and intrigues are to be found among them as among those more civilized. Considering all of the facts just enumerated, and that this race is as free from the inhibitions of civilization as any of the natural races, also the close commingling of the sexes and the lack of privacy in the home, necessitated by unalterable environmental conditions, the sexual life of these people becomes understandable. The stimulating effects of a straight meat diet and the irritation of the sexual organs which often accompanies intestinal indigestion, so common among them, are also factors worth consideration in studying their sexual life.

If there is gambling among them no instance was discovered and, while the writer would not say that there was none, it is not practised to a very considerable extent.

On the whole it might be said that these people are possessed of many very likable qualities, and during his short stay on the island the writer became much attached to them. They have many virtues and their faults might better be called weaknesses which harm no one so much as themselves, while those factors which have made most for their moral and much for their physical degeneration have been introduced from without.

WASHINGTON, D. C.

SOME PROPERTY CONCEPTS AND MARRIAGE CUSTOMS OF THE VANDAU

By MELVILLE J. HERSKOVITS

THE VANDAU, a tribe of Portuguese East Africa, are of interest because of the resemblance of many of their customs to those already noticed by Junod among the Thonga, their neighbors to the south, by various writers among the Zulu and Kaffirs, who live to the west and southwest of the Vandau, by Smith and Dale among the Ba-Ila of Northern Rhodesia, and by Stannus and others among the Wa-Yao of Nyassaland. The information contained in this paper was furnished by A. K'amba Simango, a native of this tribe and a student at Columbia University, who has set forth in great detail the concepts and customs remarked below in the course of a number of extended conversations with the writer during the past year.

The government of the Vandau consists of a chief, sub-chiefs under him, and head-men over the individual kraals. The office of chief is hereditary, passing from father to eldest son, and the chief is the ruler of the tribe. The sub-chieftainships are also hereditary, in the main, but a sub-chief may be removed by his superior for cause, and in this case the successor is appointed. The headship of the kraals is not hereditary—if a man establish a kraal, he is considered its head, but, if he should die soon after its establishment, the next eldest brother becomes head-man. The son of the original head may take charge if he is thought sufficiently capable, but as far as could be gathered the "human element" enters into the selection, and the man who is generally thought the most capable naturally assumes charge of affairs at the death of the former head-man.

When an individual comes into the country to settle, there are two courses open to him. If he wishes to settle in a kraal, he obtains the necessary permission from the head-man of that kraal. If, however, he wishes to establish an independent settlement, he must obtain the consent of the sub-chief of the district

in which he wishes to settle. In the first case, after he has been accepted, he may start a garden on any of the unoccupied land near the kraal in which he settles. In the latter, land is assigned to him by the sub-chief, usually near the kraal he has established, though it may be at some distance from it. This land is his as long as he uses it. It is even his as long as he claims it, and even if he does not make actual use of it no one else may touch it without his permission, provided he has once cleared it. If he has settled in a kraal, the land assigned him by its head is his property; if he has established a kraal, the land of that kraal is looked upon as his, and he is regarded as grantor of it to those under him, and has the say to whom it shall be given. The land which the members of a kraal may take for their gardens depends, first, upon the extent to which the land surrounding the kraal has been taken up by earlier comers, and, next, upon the distance between the kraal and its neighbors. If these are close together, only a few persons may have gardens between them, while, if they are farther apart, everyone may have his plot comparatively near the kraal in which he lives.

If a man moves away from the spot where his garden was, or very evidently deserts the land he has worked in the past, it becomes what may be termed open or public land, and reverts to the head-man for reallotment. The original owner loses all claim to it. Thus, if he has planted banana trees, anyone may have the fruit, while if another person later settles on this land, and the original owner takes fruit from the trees he himself planted, he may be prosecuted for theft. However, a man need not necessarily cultivate all the land to which he lays claim as owner. If one cultivates during the first year a garden which occupies only a portion of the allotted land, but continues to extend it from season to season as opportunity permits, he may mark out a place as the ultimate limit of his garden, and no one may use any of the land between that mark and his garden, even though it be untouched as yet by the claimant. In this, as in everything else among the Vandau, the element of reasonableness must be taken into consideration. The people of a kraal in which there is scarcity of land would not tolerate for a moment the appropriation of more land

in this way than a man might be reasonably expected to use in the course of two or three seasons of extension. The sale of land is unknown, though a man may, on moving elsewhere, give over the rights to his garden to a friend.

Once the grant has been made, the chief who makes the grant relinquishes all right to any direction over the land he has allotted. He may not tell the man who works the land what he must do with it, nor may he demand rent in kind. There are certain instances, it is true, in which religious reasons induce persons who are working land to give of the first-fruits of their produce to the chief. These, however, are freewill offerings, and are not demanded. When hunting is indulged in, the chief has the right to certain portions of the game, usually the head. Hunting land is in no way restricted. Anyone may hunt anywhere, the only provision being that there must be no hunting of game on cultivated land, as this would constitute trespass, and the trespasser would receive a beating from the owner of the land if he persisted in his trespassing after due warning had been given him, while he would be compelled to restore in kind any produce he might have damaged. The sending of the head of the animal slain to the chief is more in the nature of a recognition of the power of the chief than tribute, according to the information given.

All grazing land is free. It is usually situated some distance from the kraal, since the land closer in is occupied by gardens under cultivation. It is not the case, among the Vandau, that each kraal has its district, within which any member of the kraal may take his cattle to graze. All the land not cultivated is free to anyone, and a person may take his cattle wherever he can find the best pasturage for them. The same holds true in the case of fishing rights, and the only case in which these might be restricted is one in which a man might have many gardens completely surrounding a small lake. Even in this event, however, the Vandau would regard the lake as free, but access to it being over privately owned land, he might not exercise his right without committing trespass. However, in the case of the rivers and larger pools anyone may fish without asking permission. Trespass is punished by a beating, or, in case anything is damaged, by payment in

kind. The person whose land is entered has no right to kill the trespasser, and, if he does so, he is liable to be held and made to work for the family of the man he has killed, or to be compelled to pay blood-money in the shape of cattle and hoes to compensate them for their loss. Slaves were ordinarily taken in warfare, and, except in cases such as that just mentioned, the Vandau disliked to enslave members of the tribe if this could possibly be avoided.

The right of a woman to her garden is well established, and no one may interfere with it. The husband, of course, has the right to take food from it if he is hungry and needs it, but he may not give anyone else permission to take anything from a garden worked by his wife. Men have their gardens as well as the women, and in this case they may do as they please with the produce from the land they themselves have worked. Once a plot of ground has been allotted to a wife, however, the land and the results of her labor on it are hers, and the husband has no say as to what is to be done with it.

The Vandau are cattle-keepers, and regard their cattle as signs of wealth, as is the custom in almost all of East Africa. They are not the avid meat-eaters that their neighbors to the west, the Zulus, are known to be, and although cattle are occasionally utilized for food, this is not often, and is usually on some ceremonial occasion. Cattle are obtained by gift or by being earned. As a boy grows up, the elder members of his family, wishing to help him attain a good position in the community, will assist him by gifts of cattle, and in this way enable him to obtain those things which are looked upon as right and proper for a man of standing to have. If the young man is ambitious and wishes to increase his wealth, he may take care of the cattle of a wealthy neighbor, and is usually given a cow or two for his work. After a man is married and has daughters of marriageable age, they bring him more cattle as they are betrothed and married. Everything is privately owned, and communal ownership is unknown. It may be said, of course, that the ownership of land as sketched above might be termed communal, but it must be remembered that even this is regarded as ultimately being the property of the reigning chief,

and through him, of the sub-chiefs and head-men. As in the case of land, women have equal rights in property with men, though a man may exercise a certain advisory right over the property of his wives or sisters. Here, again, the element of the difference between principle and practice is to be noticed, for while a woman may have every legal right in the world to a cow, she would most probably never dream of disposing of it without first consulting her husband, even though there be not the slightest compulsion for her to do so. Although a woman may own anything a man may own, the general rule is that the members of each sex own those things with which they are most concerned. Thus, a woman would have no use for a bow and arrow, and would therefore not own them any more than a man might be expected to number household utensils among his possessions. It is seldom, also, that a woman is found who owns a dog; on the other hand, the ownership of the chickens, which are used constantly as food, usually vests in the women.

According to the information obtained, wealth is not the only determining factor in making for the position of the individual in a community. Indeed, it was maintained that it often happens that a man comparatively poor may be head-man of the kraal in which he lives. However, it is to be suspected that by "poor man" is meant an individual who has distributed his wealth among his wives, and who therefore owns his possessions only indirectly through them. Strength, on the other hand, is greatly admired, and the strong man is looked up to and if he has ability may rise to high position at the "court" of the chief. In the days before European occupation pacified the Vandau and made an army impossible, such a person might have risen to an important place in the army if he showed ability as well as strength.

A man may give as many cattle as he wishes to his sons or his wife, and in this case, as has been remarked immediately above, he relinquishes all but the most general control over them. Otherwise, they are his own property, and no one may interfere with whatever he may desire to do with them. Inheritance is in the male line. The eldest son of the first wife of a man, or the eldest son of the next if the first have no sons, gets the larger portion of

the estate, but the cattle are inherited in part by all of the sons. None is left entirely unremembered. If there are enough of the animals to constitute a large estate, the brothers of the deceased may also get a few head of cattle each, but the impression left was that all the sons must be taken care of first before this may occur. There is no such thing as a testamentary bequest known, and this is true, of course, of practically all of East Africa. The amount taken by each son varies with the strength of personality of each individual member of the family. It is quite conceivable, and, indeed, often happens, that a younger brother of strong personality and aggressive disposition gets much more than is considered his rightful share of his father's estate. Daughters do not inherit, according to the general custom. If they are old enough to inherit property, the Vandau feels that they should be married and under the care of their husbands. Since a husband inherits the property of his wife, the inheritance of property by a daughter who is married would mean that property would ultimately be transferred from her family to that of her husband, and this effectually bars her inheriting anything from her father. If the daughter is unmarried, she is considered to be too young to inherit property in any event, and is placed under the care of an elder brother or a brother or sister of her father.

As is the case with most of the natives of Africa, the Vandau have a fondness for submitting their disputes to regularly constituted native courts. The cases are brought before the principal chief where this is possible, or before his subordinates. A small fee is given the chief by the plaintiff when a complaint is brought, and there is no further payment of such fees necessary, this being all the person who passes on the case receives. A messenger is sent to the defendant by the chief, and is paid by the former for his trouble. The summons thus brought must be heeded, or he is brought by force to the court and fined for his negligence. Evidence is necessary for conviction—thus, in cases of adultery, the confession of either party to the act or the evidence of any eyewitness is necessary before a decision against the accused can be rendered. Each party to a dispute takes care of the conduct of his own case—that is, there are no persons who do this work pro-

fessionally for others, but the calling of the necessary witnesses, and the general direction of one's case lies in the hands of the person concerned. According to the information given as to the power of the courts, it is apparent that the religious sanctions do much to lighten their work, and the attitude of the Vandau toward the prevailing customs under which he lives is quite as much fear of the spirits who rule as of the punishment meted out by courts. Thus, though it is a punishable offense to steal, the most serious deterrent to committing this crime is the fact that a result would be incurring the wrath of the spirits who watch after the effects of the person who is robbed. Again, it is punishable to step in a spring from which many persons obtain their water; aside from common consideration, it is believed that to do this would be to cause the spring to become dry, and care is taken not to transgress the taboo. It is this attitude which makes for the enforcement of the law, according to Simango, to a much larger extent than the fear of courts and their punishment.

In the event that a young man wishes to get married, there are several ways in which the match may be arranged. In almost any event, the parents of both the boy and the girl have much to say in the matter, and if either family wish to prevent the match, they usually can do so by exerting the proper pressure. While the parents of the boy may object, it sometimes happens that he persists in marrying the girl whom he wishes for his wife, and in this case he leaves his family at his marriage, takes a new plot of ground on which to build his hut, and in this way starts a new family and cuts himself off to a large extent from his own relatives. It would seem somewhat more serious in the case of marriage in the face of objections on the part of the girl's family, for they will make it very unpleasant for her fiancé when he comes to pay her a visit, or later, after marriage, when he comes for her after she has been visiting her parents. Usually, though, if either party to the match insists on it strenuously enough, the parents will give in and grant their consent, for there is great reluctance among the Vandau to countenance anything which might lead to a break in the family relationships. There is a strong attachment between members of the same family, and it is felt that marriage helps

strengthen the family and build it up, and this is the desideratum of every family among the Vandau. That is the reason why the members of a family will materially assist the young man who wishes to get married with loans, so that he may accumulate the necessary bride-price, for each marriage helps make the group larger, and, the more marriages there are, the more children there will be, the more people will carry the name of the family, and the more renowned it will become in the eyes of the other members of the community.

The family of the girl demands a dowry from the man who wishes to marry her. In some cases, the girl has very little to say in the matter, and this is particularly true if all arrangements have been made while she was very young, and the dowry was paid for her before she was old enough to be consulted in the matter. When she attains the age of marriage, which is from fifteen to seventeen years of age, she simply fulfils the conditions which her parents may have imposed on her, if she is already betrothed. But if she is grown and offers are made for her, she may accept or refuse the suitor as she pleases, and though it sometimes happens that her family may coerce her into a match of which she does not approve, this is not usually the case. A strong impression is left that the women of the Vandau have a rather large amount of independence in matters which concern them personally. The dowry is usually paid in cattle, and this custom is similar to that found among the Thonga, the Zulu, the Ba-Ila, and all peoples of East Africa who possess these animals. The number of animals given for a wife varies with the social status of the individuals concerned. After the price is settled upon and paid, the marriage is consummated. Even if there are no children divorce does not ordinarily ensue, although in such a case the family of the wife may give the man a sister of his wife at a dowry which does not amount to as much as the one he originally paid for his first wife. The dowry paid for a daughter is the personal property of the father, although the mother of the girl has what we should term a moral right to say as to the determination of what should be done with the amount he has received for his daughter. There is another restriction also; if there are unmarried sons, the father is

supposed to devote the sums he has received for his elder daughters, or those already married, toward providing the means for his sons to accumulate the dowry necessary before they, in turn, can marry. The accumulation of the necessary amount is something of a problem for the young man, for occasionally the sums of money or the number of head of cattle required is anything but small. It is true that the bride-price was not as high as among the Zulu, where as many as fifty head of cattle might be demanded for the daughter of a chief, or twenty-five for a girl whose father was a commoner; the amounts given by the Vandau were somewhat less. Today, however, the influence of the whites has brought about a great change in the medium of payment, although the principle behind the payments remains the same as ever. In the case of the sections of the Vandau situated inland, cattle are still passed before marriage, but nearer the coast European money is given instead.

According to Simango, the dowry is a gift on the part of the prospective son-in-law to the parents of his bride to show his good will toward them and their daughter. If divorce ensues after the marriage, the husband may usually claim repayment of the dowry he has given, and, unless his wife can prove that she was mistreated beyond her endurance, her parents must return whatever was passed for her. If they cannot make this repayment, the wife must be returned to her husband, to bear his illtreatment as best she is able. Despite the fact that divorce does not occur when the wife fails to bear children, it seems that the dowry, in practice, is really payment on the part of the husband for the child-bearing ability of his wife, since in bearing children the wife furthers the family of her husband and thus increases his position and prestige. It is significant to notice that among the Vandau, as among so many other tribes of East Africa, in cases where the husband has not paid the entire dowry, his wife may leave him at her pleasure and he has no recourse, while in the event of his death the children are regarded as belonging to the family of his wife rather than to his own family, as would ordinarily be the case. This is also true in case of divorce; if the dowry has been paid in full, the children remain with their father, but if it has not been completely paid,

they go with their mother and become part of her family. At the death of a man, his brothers take his wives as their own, or, if he has no brothers, his sons and nephews may take those of his wives who are not too old, although this practice is frowned upon as a general rule. If there is no one to marry the widows, they may return to their own families, but this is not usual.

When a young man is old enough, he leaves home for a time and goes where he can get work and earn money for himself. On his return he gives all of his earnings to his father, who then asks him how much he wants for his immediate needs. The son takes a small portion of the total amount, and then indicates to his father that he should take a portion for himself as a gift. After the father has done this, the remainder is kept for the son by his father—the head of the family is, apparently, the banker for the members of his family, and does pretty much as he pleases with what they have given him to keep for them. He may be called upon for the money when the young man is in need of it—as, for example, when he gets in trouble or wishes to acquire a wife—but the father would not hesitate to use the sums given him for safe-keeping to assist a son other than the one who gave him the money. The young man, on his return, also makes gifts to the other members of his family, and, if he does not do so, he is thought churlish and mean. It is quite possible that this custom is at the bottom of the "nanga" remarked by Smith and Dale in their description of the Ba-Ila.

The average number of wives in a family, in the olden days before the coming of white influence, was two or three. At present this is not the case, and this is due mainly to the vast increase in the cost of living, to the burden of the hut tax, the change in clothing and its increased cost, and similar causes. It is only the wealthier members of the Vandau who can afford to have a number of wives, and such persons, naturally, are not many. Before this was the case, instances might be found of one man with as many as ten or even twenty wives, but this is extremely rare at the present time. To have as many wives as is possible is thought highly desirable for a number of reasons. In the first place, they insure the husband a more comfortable living. With

many wives one may have more fields under his general control and in this way, if he is on good terms with his wives, have more produce than the ordinary person for his own use and for the purpose of feeding his guests. Then, too, a man who has many wives acquires prestige in the community, for since it requires wealth to obtain wives, the man who has many is recognized as a man of wealth and position, and, because of his wealth, is recognized as having power among the people with whom he lives. So the number of wives a man has offers a good index to his place in his kraal, and a person who has many is ordinarily quite respected by his neighbors. Still another reason why wives are regarded as valuable is that the children they bear are a distinct asset to the father. While they are young, the boys herd the cattle of their father and the girls help their mothers about the huts and in the gardens. Later, the girls marry and bring appreciable sums in cattle and currency to their father, while the boys also marry, bring their wives to live in the kraal of their father, and these enlarge the family, make its prestige still greater, and help in the work of the kraal.

NEW YORK CITY.

FIGURES OF SHIPS AND THE FOUR-SPOKED WHEEL IN ANCIENT IRISH SCULPTURE

By GEORGE T. FLOM

THE prominent place that figures of ships and wheels occupy among the rock-tracings of the North is well-known. It is also recognized that some of the occurrences of these figures on stones connected with ancient burial go back to the closing centuries of the Age of Stone, a period in which the cup or "bowl-depression" is decidedly the dominant figure. The tomb- and rock-markings of England, Scotland, and Ireland, in both their compound and their simpler forms, present a considerable community of figures with those of the North. Nevertheless, it is a striking fact that, numerous as these sculptures are, the ship and the four-spoked wheel are both lacking in England, and the wheel of the type in question has been found only once in Scotland, and the ship possibly two or three times. On the other hand several examples of each figure are now known from Ireland.

In the following pages I desire to bring together the evidence regarding these two figures among Irish sculptures; with reference to the ships I identify one additional complete figure and several incomplete ones as carvings of ships, which therefore, if I am right, are to be added to those identified before. I shall first speak of one incised on a stone from the tumulus at New Grange. The figure was first recognized as a ship by George Coffey, who gives a very fine reproduction of it as Fig. 4, Plate VI, in his memoir *On the Tumuli and Incised Stones at New Grange, Dowth and Knowth.*[1] It had before that been imperfectly drawn and considered to be, perhaps, some kind of inscription. Professor Coffey compared it with a similar figure on a stone at Locmariaquer, Brittany, France, and some tracings of ships on Swedish rocks. The author felt that his identification was fortified by the presence at New Grange as at Locmariaquer of an accompanying

[1] Published in The Transactions of the Royal Irish Academy, vol. xxx, 1892-1896.

sun-symbol, the circle, placed in the former immediately above the ship. I add that the latter feature is rather frequent among Scandinavian tracings.[2] Subsequently Coffey discovered at Dowth an apparently certain example of such a figure, something that gave new support also for that at New Grange. From the account of the finding of the carving at Dowth I quote the following from the author's *New Grange and Other Incised Tumuli*.[3] "The interest of the present discovery lies in the fact that we have no longer to argue from general resemblances, but have now an example which may be said to be identical to those in the Baltic. The under surface of the lintel-stone on which this figure occurs is just six feet above the floor of the chamber. The upper surface slopes back like a desk; and it is on this surface that the markings are found. The illustration shows that three or four ships have been cut on this stone. There are numerous natural markings on the stone, and the artificial cuttings are in places very indistinct. It is not possible, therefore, to make out with certainty all the figures. Fortunately the principal boat is well marked. The cutting of this figure, as also some of the others, has been done with a pick of some sort in the manner which is characteristic of most of the cuttings. The haphazard way in which the ships are placed on the stone, without order or uniformity of position, is characteristic of rock-markings in general, and in this respect does not depart from the Swedish examples." The ship in question, which occupies the center of the figure-complex, is very similar to one of the Locmariaquer figures, with high, only slightly curved, prow and stern, and three crew-strokes. The tracings are in both cases quite crude, and the ship-forms of a type much more primitive than the great majority of those of Scandinavian rock-tracings. They remind us somewhat of a few of those of the Löberg group, Norway,[4] and of occasional ones seen among those of Bohuslän, Sweden. I shall come back to this point below.

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[2] As at Begby, Smaalenene, and Haugene, Sandeherred, Norway, and Bra:t id and elsewhere in Bohushän, Sweden.

[3] Pp. 59-60.

[4] Shown pp. 52-53, vol. 1901-1902, Aarsberetning. Foreningen til norske Fortidsmindesmarkers Bevaring.

To the above two instances of ship-carvings I would add a third, namely one that appears on stone *c* of cairn *U* of the tumulus at Loughcrew,[5] as shown in the Du Noyer drawings, published by Wm. Frazer.[6] This stone is herewith shown as Fig. 56. Whether the figure at the top of this stone has been identified before as a ship I do not know, but I find no discussion of it in publications on the Loughcrew sculptures.[7] The ship in this case differs slightly from the two at New Grange and Dowth; the lines of prow and stern are both curved, rather prominently as the illustration shows. The sun-symbol above and between the high prow and stern is also here to be noted; at New Grange the circle is cut just above the ship. In the Loughcrew figure another circle is carved as part of the prow. The somewhat squarish figure in the same relative position at the stern may also be intended for a circle; it is to be observed that a similar squarish four-spoked wheel occurs at least once at Dowth (on stone no. 2), while at Loughcrew both the single ring and the cupped concentric ring-figure sometimes have this shape, as, especially, the two rings with a cup in the center, on stones *h* and *b*, both in cairn *T*. The oval-like ring above the ship at Loughcrew has its counterpart in a similarly carved cupped ring lower down on the same stone on which the ship appears. Finally, the presence of two more circles

FIG. 56.

[5] In the cairns of Sliabh-na-Calliaghe, at Loughcrew, near Oldcastle, County Meath, Ireland.

[6] Published in Proceedings of the Society of Antiquaries of Scotland, vol. XXVII, pp. 294-340, in connection with Frazer's description of the sculptures. The excellent illustrations are from a series of ground-plans and water-color sketches by G. V. du Noyer, of the Geological Survey of Ireland. There are figures of sculptured stones.

[7] Professor Frazer gave no interpretation of the figures. The stones in question are not mentioned by Professor Coffey.

above the Loughcrew ship, apparently cut with very small shallow cups or very short lines, is to be noted.

There are, then, three complete ship-figures, one from each of the three tumuli, besides the three incomplete ones identified as such at Dowth. I find two or three other examples, among the many undetermined figures at Loughcrew, that seem to belong here. I have Frazer's illustrations before me; there is first one at the upper right hand corner of Stone *m* of Cairn *L*,[8] with keel curved at the prow, but with rectangular stern and again with the sun-wheel, here above and slightly in front of the prow. We may compare one of the Begby ships from Smaalenene, Norway, where a sun-wheel of four spokes is set into the prow.[9] I think it likely, too, that we have an incomplete ship on Stone *o*, *o*, *T*, at the upper left above the two groups of cupped concentric circles.[10] This would seem to be an incomplete example of a type of ship seen on the rock-tracings, in which the frame is indicated not only by the vertical strokes of which we here see three, but also by several horizontal strokes, representing the side-planks of the frame. There are finally at Loughcrew several examples of a horizontal straight line, above which several short vertical lines are cut, as once on *o*, *o*, *T*, and on stone *b*, *S*, where the long line is slightly curved, and again once on stone *a*, *S*. It seems not unlikely that in these cases the keel and frame of a ship is intended, or perhaps the railing and ribs of the ship.

What information can we gather from the three complete ships regarding seafaring craft in Ireland at the close of the Stone Age, and what relation do they seem to bear to the Mediterranean type on the one hand and to those of the Scandinavian North on the other? In a series of articles on problems connected with the rock-tracings published some years ago Mr. A. L. Coll, Christiania, Norway, offers a classification of the various ship-forms found among Scandinavian tracings, supplemented by others that appear on Bronze Age objects (usually engraved on knives and razors),[11] and he compares these briefly with Mediter-

[8] L. c., Fig. 34.

[9] L. c., p. 119, Fig. 6.

[10] L. c., Fig. 54.

[11] Aarsberetning, 1901-1902, and 1905-1906; see above note 4.

ranean ship-forms. Coll finds that there are six types of ships on the rock-tracings, ranging from very simple ones to those of greater size, exhibiting more developed forms. Illustrations of the more elaborately constructed ships, types *d*, *e*, *f*, are given from Smaalenene, Norway, and Kville Parish, Bohuslän, Sweden. Ships of the first three types, *a*, *b*, *c*, appear also here and in all regions that are characterized by the south Scandinavian rock-tracings.[12] The simplest types are certainly correctly assumed to be the earliest; on the taller surfaces of rock-walls near water, the simplest forms are regularly highest above the water; at the time the simplest figures were carved the level of the water was about at the foot of those upper tracings.

Type *a* in the series consists merely of a curved line with raised prow, and a series of short crew-strokes above the curved line. The next stage exhibits a double prow, and also raised stern, beyond which the keel projects somewhat. The third type has in addition to the keel, also running parallel, a curved line for the railing, and the two are usually joined fore and aft by cross-strokes. The cases where these are absent and keel and railing are represented merely by the two parallel lines are assumed to be intermediate, i.e., early forms of type *c*. The beginning of the more developed forms is in the direction of presenting more fully the frame of the ship, at first by cutting several vertical strokes for the ribs; in place of these, or sometimes conjointly with them, there follow, then, the horizontal strokes between the keel and the railing, strokes which represent the outer planking of the ship.

Now as to the Irish ships. The three apparently incomplete ship-figures from Loughcrew may be crude carvings of the most primitive forms above. Except for the straightness of the horizontal line on two of them the figure is quite like the ships on the Herrestrup dolmen and on the "Horse-rock" in Blekinge, Sweden. Similar figures of incomplete or primitive boats cut with straight line are sometimes seen among the rock-tracings. In some of these, where the bow is not indicated by a curved keel-line, these

[12] As distinguished from the naturalistic North Scandinavian sculptures, which are probably older.

figures are probably intended to be representations of a part of the ship, the rowers, and the railing on which the oars rested.

Of the complete ship-carvings discussed above, that at New Grange, and apparently also one incomplete figure at Dowth, belong to type *b*, with double prow, but they are irregular in that the keel does not project beyond the stern. With its rectangular stern (if it is to be regarded as complete) the New Grange figure shows an intermediate form between types *b* and *c*; its lines remind us of one of the ships on the Leervaag Rock, Atle Island, western Norway,[13] and occasional ones seen in Tanum Parish, Bohuslän, Sweden. The complete ship at Dowth shows the double parallel lines for keel and railing, but unconnected at both bow and stern. The carving is rather crude, but the ship clearly belongs with the early forms of type *c*.

Finally as to the Loughcrew ship. The carvings show the form of type *c* as regards the two main lines for keel and railing; but with a single prow (cf. the New Grange ship). As the double prow preceded the railing or deck-line in the development, this shape is irregular from the standpoint of the ships of Scandinavian rock-tracings; it is evidently not wholly lacking there, however. A similarly cut ship, with part of railing indicated, is seen on a rock in the Parish of Sotenäs, Bohuslän, Sweden. I shall not attempt to say whether this ship is a form belonging between types *a* and *b*, or whether we have in this case the sun-ship, which preserved the simpler primitive lines, carrying them over into a later period, giving to the traditional one the railing of the ships of the time. Coll found very few points of contact between the ship-forms of the North and those of the South of Europe; the northern art of shipbuilding developed on the basis of native experience and initiative. The few ships that we have among the ancient sculptures of Ireland seem most of them to range themselves under the Scandinavian types; but along with these there are also suggestions of a development independent of this. It is possible that several of the unusual and apparently unfinished figures on

[13] Shown, e.g., as Figs. 163-164, Table 45, in Skandinaviens Hällristningar, by Axel E. Holmberg, 1848. Also shown on p. 84 of Guide to Northern Archaeology, by the Right Honorable The Earle of Ellsmere, London, 1848.

some of the stones at Loughcrew belong with this group. If so the relative importance of the element that seems independent of the Northern current would be larger than it now seems. At least two of them resemble somewhat the frame of the ship-ornament on a Greek vase (Troy, shown *Aarsberetning*, l.c., 1902, p. 133).

Then as to the date to which the ship-figures belong. The rock-tracings have been shown to be in the main from the Bronze Age, and thereby also the greater part of the ships; however, the cup-hollows in particular, and further the wheel and the ship, also appear in some cases in connection with late Neolithic graves, hence from the same time as the tumuli at New Grange, Dowth, and Loughcrew. It would seem very probable that some of the simple ship-tracings on loose boulders or on ledges of rock in Skåne and Bohuslän, Sweden,[14] go back to the Stone Age. In view of the correspondence in form as between the ship-carvings in the tumuli in question on the one hand and the more primitive types of the same time in Scandinavia, it would seem likely that the ship as a religious symbol in late Neolithic and in Bronze Age Ireland was borrowed from the Scandinavian North.

If the figure of a ship which appears among the carvings in the Factors' Cave, East Wemyss, Fife, Scotland, be of Bronze Age date, it would furnish interesting evidence of the road by which this influence reached Ireland. In the Court Cave, East Wemyss, there are two much weathered and roughened figures, which look like the carvings of small boats of the most primitive type.[15] The ship does not seem to appear among the figures inscribed on rocks in the open anywhere in Ireland. These are here, as in the more numerous sculptured rocks of England and Scotland, largely limited to the markings of cup-and-ring and the modifications of this figure. I am not prepared to say at present whether the ship-

[14] Several shown by O. Almgren, Tanum Härad Hällristningar, Göteborg och Bohusläns Fornminnen, VIII, 1906-1912, as p. 478, 483, etc.

[15] That it has symbolic significance is suggested by the presence here, too, of a circle below one end of it. The sculptured caves of East Wemyss are treated by John Patrick in the Illustrated Archaeologist, vols. XI-XII. In this connection the ship-sculpture recently discovered at Roskar, Gurskö, Söndmöre, Norway, may be compared. It is dated early Bronze Age by A Björn, Naturen, Bergen, 1916, p. 380.

symbol neverthless remains in some cases in a reduced or schematized form.

The Four-Spoked Wheel. It has been observed above that the four-spoked wheel symbol is lacking in England, occurs only once in Scotland, but several times in Ireland. I shall speak very briefly of these cases here. For Ireland the occurrences that have come to my attention are as follows: in the tumulus at Dowth stone no. 2 shows a perfect example of a small wheel-figure, and also another larger one, whose enclosed circle is flattened slightly on one side; stone no. 3 exhibits a cross-wheel which is enclosed in an open circle;[16] Loughcrew stone *d,S* shows an incised cross-wheel with a similar ring (spiral of one turn) around it. It forms the central figure in a group of, mainly, cupped rings (once a rayed ring);[17] stone *e,U* contains the figure of a wheel with eight spokes.[18] It is a clear-cut wheel-figure, not one of the rayed sun-emblems so characteristic of the Loughcrew groups. The occurrence of crosses or four-spoked figures with double furrows for each spoke and without the enclosing circle may be noted, however. In the form shown here (Fig. 57, *a*) one occurs on stone *a,S*, while Fig. 57, *b* appears on stone *o,T*. Wheels with four spokes are sometimes seen on the carved rocks of Mevagh, County Donegal, three times in the illustrations by Wakeman.[19] One of these is enclosed in a circle,

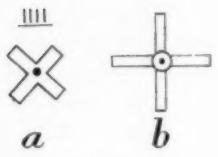

FIG. 57.

FIG. 58.

[16] New Grange and Other Incised Tumuli, pp. 56-57.

[17] Proceedings of Society of Antiquaries, l.c., Fig. 42.

[18] L.c., Fig. 62.

[19] A Handbook of Irish Antiquities, by William F. Wakeman, Dublin, 1891, pp. 31-34.

another in an incomplete circle; in a third the spokes do not touch the enclosing circle. A marking in the same group contains a cup at the end of one of the arms of a cross.

The four-spoked wheel has been recorded once for Scotland, namely at Cochno, Dumbarton.[20] I would also mention in this connection the ornamental ball from Budfield, Aberdeenshire, shown here as Fig. 58, reproduced from Plate XI, of John Alexander Smith's valuable monograph on forty-eight like balls in Scotland, published in the *Proceedings of the Society of Antiquaries of Scotland*, Vol. XI.[21] This ball has seven discs or projecting knobs with curved tops; each knob is incised with a pattern of crossing lines. It is again the cross or four spokes cut within a circle; the sun-wheel being here not cut in contour as a circle or a ring, but cut in relief, curved and projecting from the surrounding surface between it and the other five discs about it, thus being intended to resemble the curved surface of the sun itself. Finally there is a third and very unusual example, a stone fragment; four concentric cross-wheels around a central cup, and with a ringed cup just inside the outer ring. Illustration: *Proceedings of the Society of Antiquaries of Scotland*, VI, Plate XVI, Figure 1.

In the cross-wheel also, then, as in various other ways[22] we seem to have a point of contact between the Celtic West and the Scandinavian North but one, it must be added at once, where the borrowing is probably incapable of proof. For, on the analogy of the wheel of the primitive wagon, the conception of the sun-disc as

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[20] J. Romilly Allen: Celtic Art in Pagan and Christian Times, London, 1912, p. 59.

[21] Pp. 29-62, and supplement pp. 313-319.

[22] Summary of some of these matters in above works by Coffey, New Grange, etc., chapters V-VI and X. See also J. Romilly Allen: Celtic Art, pp. 21 and 48-60. The subject was dealt with at length by George Coffey in The Origins of Prehistoric Ornament in Ireland, 1897. The theory is that the spiral, coming from the Aegean Islands, first reached the Scandinavian North (probably by the amber route); then later from Scandinavia the symbol travelled by way of Scotland and northern England to Ireland. Professor Coffey seems also to hold that other sun-symbols characteristic of the Scandinavian North, and present in ancient Irish sculptures, were also introduced into Ireland from Scandinavia. But for certain simple sun-symbols an independent origin in different regions must be assumed. The assumption of borrowing is here unnecessary.

a wheel of four, six, or more, spokes was a natural one, which we should expect to meet almost anywhere among sculptured representations of the sun-wheel.

UNIVERSITY OF ILLINOIS,
URBANA, ILLINOIS.

SOME COMMENTS ON THE INEDITED MANUSCRIPT OF POMA DE AYALA

By PHILIP AINSWORTH MEANS

IN THE case of a country like Peru where ancient documentary records are entirely lacking, any kind of evidence which even faintly indicates the course of early history is peculiarly valuable. Thus it comes about that certain works written by Jesuits and other priests and by other Spaniards of education in the sixteenth and seventeenth centuries are, for Peruvian prehistory, the chief literary "sources." Among them figure the *Memorias Antiguas* of Father Fernando Montesinos, written about 1642 and published in English by the Hakluyt Society in 1920. In this work there are distinct traces of a highly interesting period of advanced culture prior to the rise of the Incas in the twelfth century.

Other works, notably the *Royal Commentaries of the Yncas*, finished in Spain, about 1609–1616, by a great writer, Garcilaso de la Vega, son of a famous Conqueror by an Inca princess, are of authority because of their writer's access to undefiled founts of native tradition. This work, edited by the late Sir Clements Markham, was issued by the Hakluyt Society in 1859-1861.

Another author of mixed blood, Felipe Guamán Poma de Ayala, enjoys an almost fabulous fame on account of the fact that his work has never been published. Sir Clements Markham published an account of the manuscript and Prof. Richard Pietschmann, of Göttingen University, Germany, did likewise. Opinions have seemed to vary as to the historical value of the manuscript and in September, 1922, the present writer made a study of it.

The manuscript belongs to the Royal Library, Copenhagen. Through the courtesy of Dr. John Dyneley Prince, American Minister to Denmark, the writer was able to meet Dr. H. O. Lange, Director of the Royal Library. Dr. Lange told him that the manuscript had been loaned many years ago to Dr. Richard

Pietschmann, librarian of Göttingen University, and that it was still in Göttingen. Through Dr. Lange's great kindness, the writer met Dr. Pietschmann, from whom he received every courtesy, and he was thus able to examine the manuscript. On the rough notes made during this visit, the following comments are based.

Textually copied, the title of the manuscript is *El primero nveva coronica bve(n) gobierno*. There are about 1179 pages, measuring about 10 inches by 7. The bulky work is bound in ancient parchment. Dr. Pietschmann dates it about 1613. That, indeed, seems to have been the date when it was finished. (See MS, page 10, foot.)

FIG. 59.

Quechua plow. Handle at top; plow point at bottom; foot-rest between.

The manuscript of Poma de Ayala is differentiated from all other early chronicles of Peru by the fact that it is profusely illustrated with drawings. Artistically, they are atrocious; but they possess much of that vividness and incisiveness which characterize the work in black-and-white of Thackeray and of Cruikshank, and so the pictures tell us much.

As an account of events in pre-Incaic Peru, Poma is a great disappointment. He is as credulous as Montesinos, who began his history of ancient Peru with meaningless babble about Noah and Ophir. The earliest pictures of Poma show us: Adam and Eve, Noah and the ark, Abraham, David, Christ, St. Peter, Pope Damasus, and other personages who have nothing to do with the matter. On page 46 is an inimitable picture of Solis, Columbus, Almagro, Pizarro, and Vasco Nuñez de Balboa all happily travelling on a ship in the South Sea.

On page 48, however, great interest is awakened by a picture of "Varivirachocharuna, primer yndio deste rreyno." (Early Viracocha, first Indian of this kingdom.) Viracocha, to give the more usual name to the culture-hero to whom Poma refers, is shown plowing his field with a foot-plow which I have crudely copied here (Fig. 59). In front of him is kneeling "uariuirachocauarmi"

(early Viracocha woman) who is busy breaking the clods with her hands. An exactly similar scene may be observed any day in the high Andes at the present time. See an article by O. F. Cook on "Footplow Agriculture in Peru" (Smithsonian Report for 1918, pp. 487-491). This valuable paper describes how the foot-plow, *taclla* or *chaquitaclla*, is used between 11,000 and 14,000 feet above the sea on Peruvian farms. According to Poma de Ayala, the Viracocha people flourished during some 800 years.

On pages 53-56, Poma describes and pictures the "second age" of the Indians, whom he here styles "Variruna" and "Variuarmi." The woman is in a stone hut with a stone roof, like those of the *chulpas* around Lake Titicaca, the hut being marked "pucullo." The man is outside, praying to "pachacamac maypimcanqui." The two are dressed in llama hides with the fur on. This second age lasted 1300 years.

The "third age" is that of people whom Poma (pages 58-63) calls "Purunruna." They were descendants of Noah who escaped the Deluge and interbred with their predecessors. (This is comparable to the Biblical nonsense of Montesinos.) The Purunruna lasted 1100 years. Of them it is said that "these said Indians commenced to make woven cloth" and two or more sorts of thread, and they also began to make houses with stone walls and thatched roofs (like the Incaic ones). They raised kings and lords and captains over the legitimate ones of the "uariuiracocha."

Between pages 63 and 79, Poma gives details of his "fourth age," that of the *Aucaruna*, or Warrior-man. It lasted 2100 years. The picture shows two armies facing each other. The one stands upon a stone fortress labelled "pucara" (Quechua for fortress). Its leader is armed with a spear and an oblong shield like those which we see in the early Chimu pottery of the Peruvian coast (between about the time of Christ and 500 A.D.). The others in that army are armed only with helmets, save for one man who is about to hurl a great stone upon the foe below him. The other army is on the ground. Their arms are similar, but better and more numerous. One man brandishes a sling. Another, the leader, presents the point of a long feathered spear at the chest of the enemy leader up in the fortress.

This completes Poma de Ayala's account of pre-Incaic history. The remainder of his thick book is taken up with Incaic and colonial times. It is obvious that Poma's chronology is even more absurd than those of Montesinos and Pedro Sarmiento de Gamboa. It is thus:

I.	Variviracocharuna, flourished	800 years
II.	Variruna, flourished	1300 years
III.	Purunruna, flourished	1100 years
IV.	Aucaruna, flourished	2100 years
		5300

He therefore carries the pre-Incaic period back to about 4200 B.C. (1100 A.D., rise of Incas, less 5300 years). This is obviously untenable on scientific grounds. Even the poor overworked Bible does not justify it, for the ecclesiastically accepted date for the Creation was 4004 B.C.

Resisting the temptation to depart from our task of describing the manuscript, we will now turn to Poma's account of Incaic times.

On pages 79-85 the myths relative to the fabulous origin of the Incas are re-hashed in a jargon unknown on land or sea. It is one of the charms of Poma that his language is indefinable, being a quaint mixture of Spanish and Quechua, with occasional traces of Latin and Hebrew. Another quaint habit of his is that of writing a chapter and then putting a "Prologue" at the end of it. The word *epilogo* did not exist for him.

On page 86 is a picture of Manco Capac, the mythical first Inca. He is dressed in a true Incaic costume: sandals, knee-adornments, poncho with a band of ornament around the middle and without sleeves, long mantle trailing on ground, *llautu* or fillet, and ear-plugs. In his right hand is a long staff tipped with an axhead. A pouch, presumably for coca-leaves, is slung from his right wrist, and in his left hand is a feather sunshade.

Page 88 bears a picture of "Cinchi Roca Inga," the second Inca, really the first historical one. He is similarly clad and accoutred, and in addition he bears a star-headed club of the well-known Incaic type. In the lower left-hand corner of the picture it is stated that he conquered "hatuncolla" and "ariquipa."

On pages 90 and 92, are two pictures of Christ, Who is said to have flourished about this time.

On page 96 is a very animated picture of "Lloqviivpanq," the third Inca. He walks rapidly from left to right, clad as the others, but with his mantle half sliding off and grasped by his right hand. It is said that he reigned as far as Maras. It is not clear just what is meant by Maras.

"Maita Capac Inga" appears on page 98. His mantle is secured by a large knot on his chest. The mantle passes over his left and under his right shoulder. His left hand holds a shield in such a way that we can see that the wrist was passed under a strap attached to the back of the shield. He is wearing also a feathered helmet. He is said to have reigned as far as the province of los Charcas.

Somewhat similar is the picture, page 100, of "Capac Iupanque," who reigned as far as the province of "Aymaraquichiua." Page 102 and page 104 show us, respectively, pictures of "Inga Roca" with his son, and "Iauarvacainga." The former reigned as far as "Andesuyo," and the latter ruled Cuzco, Cuntisuyu, Parinacochas, Chancas, Soras, Andinamarca, and Lucanas. (Poma's spelling is too quaint to copy.) His (Yahuar Huacac's) poncho is adorned with signs of the zodiac. "Viracocha," on page 106, also has zodiac signs on his poncho. He ruled Huancas, Yauyos, Jauja, Cajamarca, Ica, Chincha, and Rimac. He has a beard.

"Pachacuti Inga," the greatest of all the Inca kings, appears on page 108. In his right hand is a sling, and in his left a short star-shaped club and a shield. His mantle is secured by a knot on the right shoulder. His poncho, too, has a zodiac. He, Pachacutec, ruled as far as the mountains of Chile.

On page 110, "Topa Inga Ivpanqvi" is shown as an old man. A long list of conquests is attributed to him, of which Tarma and Huarochiri and Huamanga are the most interesting.

On page 112, "Guainacapac" is shown with his mantle under both arms and tightly tied on his abdomen, which is not exactly emaciated in appearance. He bears a finely feathered javelin in his right hand. He ruled Chachapoyas, Quito, Latacunga, Huan-

cavelica or Huancavilca—it is uncertain which Poma means—Cayambe, and Cañari.

"Topacvcigualpa Gvascar Inga" appears on page 115. On our left is "quisquis ynga," on our right "challcochima ynga." Huascar is led captive between them, his mantle over both shoulders and tied on his stomach. Challcuhima holds the end of a rope tied around the prisoner's neck and, with puffed-out cheeks, blows on a shell trumpet.

There are numerous pictures of *coyas*, queens, as well as of the Incas themselves. Comment will be made upon some of the most interesting of them.

On page 120 is a picture of "Mama Vacocoia." She sits under a parasol held by one handmaiden. Another combs her hair, a third presents a basin of water to her right hand. Her left hand holds a mirror probably of bronze or copper. This picture is redolent of authenticity. That of "Coia Rava Ocllo," on page 140, is somewhat similar, save that both she and her two handmaidens have deformed heads. She is washing her hair over a basin, and the maids are combing it.

On page 128, "Cocachimbomama" is shown. She is subject to fits and is having a bad one in the picture. Her mania takes the form of a tendency to bite people.

Next follows a series of pictures of famous Inca captains. On page 143 is a very amusing one of "Inga iupanqui." He lies upon a bed made of logs, with four legs. Under his head is a pillow. He has his poncho on and is covered with his mantle. The sun shines through the window above him. His pouch and sandals hang upon one hook in the wall, and his sling and llautu upon another. On the wall is written a bilingual stanza:

> dormilon perezoso capitán
> ponoycamayoc quilla cinchicona.

There are other pictures of captains, mostly engaged in battles.

On page 159 appears "Inga urcon," who stands upon a large rock which is being dragged along with ropes by men. He shouts at them "Chayapoma uiha." On the stone appears "*lloró sangre la piedra*," and the stone is indeed weeping blood. On page 160 it says of him that he was a son of Inca Yupanqui and that he

was charged with the task of causing stone to be carried from Cuzco to Huánuco and that the stone grew tired and would not move and wept blood, and that it has remained by the road to the present day. In fact Peru is full of so-called "tired stones."

Page 250 shows us four men with foot-plows and four women breaking clods while a fifth woman brings up food and drink.

On page 289 is a picture of a mummy, richly dressed, being borne on a litter to a stone "pucullo" where there are already bones. The two women attending the mummy are weeping, but the four men who bear the litter are grinning. On page 291 a man and a woman, half naked, are putting a skeleton in a hollow tree. These two pictures are very important as throwing light on burial customs.

On page 331 is seen an elaborate litter with a richly plumed roof under which Tupac Inca Yupanqui and Mama Ocllo Coya face one another as they are carried by four men.

A war-litter, without roof and lightly built, is shown on page 333. Huayna Capac is standing up in it brandishing a sling as he goes to conquer Quito and Cayambe.

On page 350 there is a picture of a *chasqui* or post-runner with clothes girded up for speed. He blows on a shell trumpet held in his right hand, and in his left he carries a basket with fish fresh from the sea for the Inca.

On page 354 we see an official, with his mantle knotted up out of the way, actively engaged in directing a workman who is making a road. In the upper part of the background are three *chulpas* or stone towers, one of them labelled "choc llo cocha nan." In the lower right-hand corner is a pyramidal structure labelled "bilcas guama capacnan."

We see a suspension bridge slung between two masonry piers on page 356.

On page 369 is a picture of Huayna Capac and Pedro de Candia having an interview at Cuzco. (No such interview ever happened, of course.) Between them, as they face each other, in their respective costumes, Huayna Capac seated and Candia kneeling, are seven gold vessels. The Inca hands a plate full of

gold grains to Candia and asks "Caycoritacho micunqui?" and Candia replies, "este oro comemos."

On page 377 is a picture of the mummy of Huayna Capac being borne to Cuzco for burial in a large roofed litter carried by four men. There is a female mummy with it, and a priest with sacred vessels, all in the litter.

Between pages 390 and 414 the pagination is very much confused. There is a picture of an Inca bed. There is also a picture of a woman working at an upright loom fixed to a tree, and of another woman with her loom fastened to the wall.

After page 414, the subject-matter is mainly of historical interest.

Between pages 494 and 525 Poma has a good deal to say about the sins of the *corregidores* in colonial times, especially in amatorial matters.

On page 564 is a picture of a weeping Indian woman working at a loom tied to a tree while a Spaniard stands over her with a club in his hand.

On page 573 is a picture of a priest holding an Indian man and woman by their hair and forcing them to let him marry them.

On page 576 is a priest, seated in an armchair and kicking a pregnant woman who kneels before him weepingly confessing.

We see, on page 594, a priest trampling on the face of a *cacique* or Indian official whom he has knocked down with a large stick because the cacique has protested against the ill usage of girls and women under his charge.

On page 694 is a picture of a weeping woman with a child at her back, working at a loom. An unshaven priest grasps her by the hair and makes her work. The text tells of the abuses practised by the priests on the Indian women.

The remainder of the book is less important. But pages 1084 to 1093 have an interesting list of *Tambos* or rest-houses scattered along the roads.

We see, in short, that, as an historical narrative, the work of Poma de Ayala is negligible. But as a source for information as to customs and usages current under the Incas and in early colonial times in Peru it is invaluable.

Various plans for the publication of this work have been made at divers times, but as yet none has borne fruit. The Peabody Museum was promised a photographic copy of the manuscript some years ago, but the presentation was never actually made.

LONDON, ENGLAND

BOOK REVIEWS

METHODS AND PRINCIPLES

The Racial History of Man. ROLAND B. DIXON. New York: Charles Scribner's Sons, 1923. xvi, 583 pp., 44 pls.

As explained by the author in the preface, this book is in large measure an experiment. It is an experiment in method and novel in that the author has entirely disregarded the conclusions of earlier authors and drawn all his inferences directly from the original data. After the customary anthropological explanations and apologies the author sets forth his method.

Professor Dixon proposed to make a world-wide survey of the racial characters of man. For this purpose he ultimately chose as his primary criteria the length-breadth and length-height cranial indices and the nasal index. As occasion arose he frequently resorted to other indices and observations but in the main his work is based upon these three characteristics. The choice of these three characters was in some measure a necessity since the measurements upon which those indices depend are among those most universally taken and offer perhaps the least variety of technique. Even when limited to these three criteria the author was frequently forced to depend upon averages alone and in some instances the cranial length-breadth index only was available. So then, the choice of criteria is no reflection upon the author but rather upon the status of anthropological method and presentation.

With few exceptions it has been customary to draw our inferences in craniometry and anthropometry from mean or average results. The few exceptions are those who instead gave the percentage distribution of index classes such as dolichocranial, mesocranial, etc., etc. Professor Dixon expresses dissatisfaction with these methods as follows (page 6):

> . . . there is I believe, an unsatisfactory feature in all of these schemes, in that great reliance is placed upon the use of averages and the data are therefore not treated on the basis of the actual combination in the individual of the several criteria upon which the classification is based. For instance, a series of skulls is measured and the average or mean or mode of the cranial

index, the facial, nasal, orbital and palatal indices, etc., calculated, and the people represented by the crania are then said to present the characters of these averages—they are, we will say, mesocephalic (medium skulled) euryprosopic (wide or low-faced) mesorrhine (medium nosed) etc., etc. Now it may well be that if actual combinations of head, face, nose, orbit and palate forms in the individual skulls are examined, hardly a single skull will show the association of characters stated on the basis of averages to be typical of the group. A large proportion of the whole series may consist of individuals who are brachycephalic, euryprosopic, platyrrhine etc., etc., while an almost equally large number may be dolichocephalic, mesoprosopic, leptorrhine, etc., etc., with minorities showing other combinations of the several characters. All such contrasts are blurred or concealed when the measurements are averaged and so the series of crania may in reality be in no sense uniform but made up of several clear cut and radically different groups each marked by its own specific combination of characters. Only, I believe, by thus taking into account the actual combinations of characters in the individual, can we reach a correct understanding of the true nature and relationships of any people.

I believe Dr. Dixon has made a good point here and that an analysis of individuals in any series will help us to interpret more sanely the averages, standard deviations, and coefficients of correlation. The physical anthropologist who has entered the field with a biological background does this visually. Thus such men as Flower, Turner, and the like drew most of their conclusions from their inspection of the material, and the averages, etc., given were more or less mere formalities. But with the development of the biometric or statistical phase of anthropology the average, standard deviation and coefficients of correlation have largely replaced an inspection or study of the material itself. Often this part of the work has been delegated to others who had only a mechanical interest. A study of original material will convince anyone that some weird mixtures have been averaged with no recognition of this fact in the presentation of the averages.

As a remedy for this situation Dr. Dixon classifies each cranium on the basis of the associated length-breadth, length-height and nasal indices. He accepts as descriptive classes the orthodox classes, dolichocephalic, mesocephalic and brachycephalic; chamaecephalic, orthocephalic and hypsicephalic; and leptorrhine, mesorrhine and platyrrhine. A given skull may be brachycephalic, orthocephalic and platyrrhine, or dolichocephalic, hypsicephalic and leptorrhine, etc., etc. The total number of combinations is of course 3 x 3 x 3 or 27. The variation of each cranial series was expressed in these terms.

Thus a series of Eskimo crania from northwest Greenland analyzed as follows:

		per cent
D-O-L	=	60.5
D-H-L	=	18.6
D-C-L	=	7.9
D-O-M	=	5.2
M-O-L	=	5.2
D-H-M	=	2.6

D-O-L stands for dolichocephalic-orthocephalic-leptorrhine, etc. Of the 27 possible classes only 6 occurred. In another series from Northern Italy 19 of the possible 27 combinations occurred. It will be seen that Professor Dixon's method does at least reflect the variability of a series.

Have we any a priori grounds for regarding these 27 classes or groups or combinations as "races"? According to the author himself we have not. But, as he points out, certain of these combinations are characteristic of certain groups usually spoken of as races. For example, the Alpine type is usually brachycephalic, hypsicephalic and leptorrhine, the Negro is D-H-P or D-O-P, the Mediterranean is D-C-L or D-O-L, etc. But even these correspondences are only rough and approximate as the author himself recognizes in the introduction. On page 5 he continues:

> Stated in general terms this would seem to imply that many of the generally accepted races, as now understood, tend to be characterized by such combinations of our three selected indices as exhibit these in their extreme forms, i.e. they are groups which do not comprise any of the medial factors (mesocephalic, orthocephalic or mesorrhine). This suggests the possibility that groups without medial factors may be regarded as definite types, now rarely found in their pure state and that all the groups comprising one or more medial factors are the result of the blending and fusion of these. . . . But before any such theory can be accepted even as a tentative working hypothesis one immediate obvious difficulty must be confronted. In assuming that intermediate forms have arisen from the blending of two extreme forms the whole complex question of heredity is at once raised. If the relative proportions of the skull and nose are subject to the laws of Mendelian inheritance, then the origin of medial forms cannot well be accounted for on the basis of mixture, since according to these laws the offspring of contrasted forms reproduce the parental types.

Professor Dixon quotes the work of Frets as giving grounds for the belief that head-form is a blending character. By analogy he assumes that nose form is also a blending, non-Mendelian character. While I am not familiar with the work of Frets, I am familiar with

several papers which give grounds for an opposite belief. (See especially papers by Boas and Von Luschan.)

But to my mind the validity of Professor Dixon's results do not hinge wholly upon the manner of inheritance, for in many cranial series he is dealing with wholly or almost wholly mechanical mixtures and in many others, where two or more races are involved, the mixture has not proceeded to the point where the parental types are outnumbered by the mixed offspring. But on the other hand if Professor Dixon's assumptions as to the manner of inheritance were true he would have been much less successful than he has been in isolating the fundamental types.

Professor Dixon's assumptions are also open to objection on several other points. In the first place it is highly improbable that the current classes of the indices can be taken as seriously as he has taken them. These classes were determined by a large number of workers with widely varying points of view and purposes. It is too much to expect that they would mechanically separate pure types for us. It also seems highly improbable to me that all individuals with intermediate characters are mixed types. At least I should want more proof than the author offers before accepting such a generalization. After admitting that he stopped at three characters as a convenience and to avoid increasing the possible combinations from 27 to 64, etc., he stands out for eight fundamental types in spite of the fact that if he had added one more character his extreme types would have been increased to 16. While it is equally true that he might not have found all of these extremes well represented it is certain that had he added, for example, prognathism as a criterion he would have separated some of his groups into two groups. This is true of his D-H-P (Proto-Negroid) group in particular. The author extricates himself from this predicament in the same manner as many others before him. He argues that the three characters he has chosen are immutable and that others which disturb his schema are superficial and malleable. While it is conceivable and probable that some characters change rapidly and others remain stable for a long time it is probably true that these have varied from time to time and from group to group so that no generalization in a group so diverse as man is possible. As to his superficial characters I doubt whether a survey of the animal kingdom as a whole will substantiate his opinion that superficial characters are more mutable than internal characters.

Above I have just argued that Professor Dixon's criteria were not narrow enough and that he has included two types under one head

(D-H-P, etc.) I must now apparently contradict myself and argue that his classes are not wide enough. An examination of his analyses will show a suspicious pairing of types such as Mediterranean and Caspian (D-H-L and D-C-L), Alpine and Palae-Alpine (B-H-L and B-H-P) and the like, two groups which are really separated by one character only. This leads us to suspect that in many instances his mechanical method has chopped off the ends of normal frequency distributions. This should not be taken as a generalization, however, for in a few instances where I have been able to check from original data I have found the two types occurring together as Professor Dixon suggests.

As other reviewers have pointed out, there are numerous discrepancies in the tables of averages in different parts of the book but a closer examination will show that in most of these cases the averages are based upon a different number of crania, which may well account for these differences. His tables of averages for his selected characters are of course not very significant since his selection arbitrarily determined them. In the conclusion he has given us several other characters such as bizygomatic diameter, upper face length (height!), gnathic index and capacity. The differences which occur are minimized and are claimed by the author to substantiate his general conclusions. But many of us cannot so lightly dismiss such average differences within a type as 14, 21, and 28 mm. in face width, 6 and 9 points in the upper face index, 6, 8, and 9 points in the gnathic index and from 200 to 300 cc., cranial capacity. These differences between the averages of the groups making up a type in many cases greatly exceed the differences between the averages of the different types.

While my criticisms are immoderately long and detailed, it is not to be inferred that this book is without merit. As Professor Dixon claims, many of his extreme types do correspond roughly to what we generally recognize as racial types. Thus a selection of B-H-L crania in Europe would in most instances isolate a large proportion of Alpine crania. In Africa a selection of D-H-P will isolate a large proportion of the Negro type. The D-H-L crania will less perfectly represent the Nordic type. Most of his other extreme combinations more or less closely approximate a generally recognized type. When these extreme forms are found in large numbers I should say they were significant. When their presence is deduced from a large number of intermediate types I am suspicious of the results. How successful Professor Dixon has been could only be estimated by a complete

re-check of the original material since he has not presented the data in such form in his book as to make this possible. To do him justice, the book should be reviewed by specialists in different areas. I feel incompetent to pass upon the book as a whole. Judging his results solely upon the basis of the Pacific material with which I am familiar, I would say that Professor Dixon has been very successful and has probably given a truer picture of racial history in that area than any previous worker. But even here I should seriously doubt the homogeneity of his Proto-Negroid and Palae-Alpine types over the entire area.

The author's adoption of such names as Caspian, Mediterranean, Alpine, etc., will undoubtedly do much to antagonize students who have already formed rather detailed associations with these terms when applied to race. Had he retained his structural symbols (B-H-P, etc.) throughout, his book would have obtained a much more sympathetic reading by many.

When the average American student reads of such groups as Proto-Australoid, Proto-Negroid, Caspian and Mediterranean types in America his credulity is shocked, yet if he will substitute for these terms the symbols D-H-P, D-C-P, D-H-L, etc., he will find one of the most interesting discussions of the distribution of types in America that has yet appeared. In some instances at least I feel convinced that Professor Dixon's world-wide analogies also hold. I believe there is overwhelming evidence of a primitive Caucasoid element in prehistoric America and that the striking "parallelism" of the Pericue material and the "Proto-Australoid" of Dixon is worthy of much more study.

Personally I have found the book most stimulating and while I should hesitate to recommend it unconditionally to the general reader I am convinced that no specialist can afford to ignore Professor Dixon's discussion of the variability, racial composition and sequence of types in specific areas. Many of his suggestions of world-wide distribution are worthy of serious consideration and his point of view could profitably be adopted by all physical anthropologists. He has probably a better view of the whole problem than any previous author of a world-wide synthesis in physical anthropology. The value of his suggestion that individuals must be studied as well as averages cannot be overestimated.

Professor Dixon should be given credit for the performance of a gigantic task. Only those who have worked in the field can appre-

ciate the amount of labor involved and the number of obstacles encountered.

It is extremely unfortunate that the author went astray in his premises for beyond this point the work is admirable. That he has not been successful in completely solving the problems which have baffled students for centuries, is no reflection upon his ability. If the book does no more than focus attention more clearly upon these problems it will have justified its publication.

There is much useful information of a geographic and cultural nature scattered throughout the book. The photographs, too, are more representative of the types of man than those in books of similar theme. The bibliography should prove extremely useful to those interested in physical anthropology. I hope Professor Dixon will continue his studies along these lines.

LOUIS R. SULLIVAN

Diet and Race: Anthropological Essays. F. P. ARMITAGE, M. A. New York: Longmans, Green and Co. 144 pages. Price $2.25.

This is an interesting but entirely uncritical attempt to interpret race in terms of diet. The book is composed of three more or less independent essays on "Diet and Physique," "Diet and Colour," and "Diet and Cranial Form." The first essay is best in form and the most critical of the three. In the second essay both diet and color are vague qualities, roughly estimated in quantity. The third essay is in very crude form and apparently only partially digested by the author himself.

The essayist's lack of an anthropological background is apparent throughout the entire book. Both in his diagrams and in the text he erroneously describes the cephalic index.

His compilation of the diets of different people may be of some use to elementary students but would unquestionably have been of much more service if he had given an occasional reference to the sources of his information.

LOUIS R. SULLIVAN

Traité Comparatif des Nationalités. ARNOLD VAN GENNEP. Paris: Payot et Cie., 1922. 228 pp., 8 fcs.

This is the first volume of a series of three which, when completed, will form a treatise on nationalities. As an aftermath of the War we have had quite a crop of books dealing with nationality and allied

topics. Mr. Van Gennep's contribution recommends itself as an attempt to apply the ethnological method in a field where hitherto statesman and theoretician have worked only too harmoniously to the grievance of truth. According to the author, facts of nationality can be studied with the same rigor of treatment as myths, ceremonies or artifacts. To that end they should be classified and serially presented instead of being considered in isolation. Thus one could discern their close interdependence and follow the genetic organization through which this interdependence is preserved under the apparent variation of forms giving to each series its particular cast and quality of permanence.

The first chapters of the book deal with the perilous task of clearing up the concept of nationality. Some definitions, from the juristic expressions in vogue during the eighteenth century to such delightful euphemisms as the recently propounded "manière de penser nationalitaire," are examined and rejected. Mr. Van Gennep, however, is not always quite precise or, perhaps, consistent in distinguishing between nationality and nationalism. The word nationalism is here used to translate the author's "sentiment nationalitaire." Nationality may mean "the quality of being a nation" as in the eighteenth century, or, as the author frequently uses it, what is understood by, *anglice*, nationalism. Of the people that have recently been promoted to the dignity of nations in Eastern Europe, some, like the Poles, could boast of a nationality, having been nations in the past, whereas others were stirred by a vague nationalism that harked back on one hand to primitive ideals of democracy, and, on the other hand, to the pattern furnished by the already successful nations of Western Europe.

Mr. Van Gennep would contend here that, though heretofore unrecognized, this nationalism is virtually as perfect as the crystallized product we call nationality. Some confusion may be avoided, it is believed, by distinguishing between them. The nation as an historical fact preceded the concept of nationality. This one was abstracted from the other. In the case of nationalism we are dealing rather with the will to become a nation. The movement may be fundamentally identical with the one that eventuated in the formation of nations. There is nevertheless something additional. It behaves in function of the past. Culture has set in. The nation is there as something to be realized. The form is known before expression takes place.

Doubts, indeed, may be entertained as to whether the peoples now in the throes of nationalism will escape the influence of the nations of Western Europe. These furnish them with directions and a definite type of organization. It is to the ideal of the nation that they turn to satisfy that desire for psychic security which Mr. Van Gennep finds at the bottom of the movement. The temptation to pattern their destinies after the experience of their elders in nationalism will be strong upon the new groups. That there is more than one solution possible ethnologists will all agree. Only the shade of Spencer could dissent. But contiguity and precedent make the steering of a new course difficult to expect. In fact you have in Europe a milieu particularly fraught with history. Some sort of cultural mnemism obtains. Nationalism, as Mr. Van Gennep conceives it, is a social process. At a lower level, lesser groups being involved, the same problem might, he suggests, be dealt with in the medium of totemism. Here, however, we have a social process which avails itself of an historical contingency.

Mr. Van Gennep finds the equivalent of nationalism in patriotism, at least essentially. Quite pertinently he observes that nationalism is something independent of the organization known as the nation. There have been nations without nationalism, like Switzerland. France seems to have yielded to it during the Revolution. Conversely, nationalism exists without the political support of the nation. The Swiss who were till recently a nation without nationalism could claim a nationality. The Poles who had ceased to be a nation could claim a nationality while adopting, in compensation for a thwarted activity, the attitude symptomatic of nationalism. The Mazurians who had no nation, who had never functioned nationally and were set up by the German government merely as a sort of pseudo-nationality, that is a separate linguistic unit, to pare down the Poles, have lately given signs of nationalism.

What Mr. Van Gennep identifies as nationality is frequently nothing more than the tendency in a population to develop coherence under some stimulus, determined in its assumption of type by the success of that recent historic form, the nation. Before the Renaissance the type might have been religion. To call such groups nationalities is like seeing them in the light of what they may or may not ultimately become. Mr. Van Gennep himself observes that new forms may soon be in the ascendant. He does not hesitate to speak of a "Gypsy" nationality. This only shows to what extenuation of

meaning the concept of nationality has been driven. It is the more striking coming after a discussion where the author plausibly identifies nationality with territoriality. He must have territoriality in the case of the Jews and resorts to symbolism to find it. The Gypsies have no sense of territoriality, but they must be a nationality. Mr. Van Gennep admits himself defeated by the evidence, but he must have them as a nationality. You feel all the time that his concept of nationality is a very elastic one in the application of which he insists sometimes on very definite and doctrinal criteria while at others he stretches it so as to cover cases which lack these very criteria.

To turn to another question, the validity of the opposition Mr. Van Gennep establishes between these two "principles," the European and the Oriental, may be questioned. In the light of the former, peoples claim the right to govern themselves, as among th Germanic tribes and wherever primitive democracy still confronts us. Despotism is implied in the latter, which Mr. Van Gennep finds instanced in Assyria, Egypt, Rome, in fact wherever great dominions have assumed consistency. Under the political system that thus characterizes the Orient, peoples are treated as chattels, mere human material to be disposed of without regard to their democratic rights. There seems to have been, indeed, an unfortunate adhesion between the spread of civilization and imperialism. Our civilization gained its early momentum among peoples that lived leagues away from the shores of the North Sea and came under the necessity of political organization when the Germanic tribes still could afford to elect their chiefs. These peoples were agriculturists who practised irrigation. Such agriculturists, dependent upon a common supply of water, generally from a river, are bound to develop organization. They form larger and prosperous units, soon the object of attacks on the part of desert tribes. They retaliate, organize themselves for warfare, and militarism becomes a feature of their life. Either they find it convenient to subdue their predatory neighbors once for all rather than fight them afresh every spring, or these neighbors themselves come seeking their protection against more numerous or more aggressive tribes of the desert. This is the "Oriental principle." Civilization travelled with it. The fact that Northern Europe was long the abode of primitive liberties did not prevent the formation there, even within the last three hundred years, of some very efficient empires. On the other hand, even in the Orient, that *fons et origo* of despotism, primitive democracy has not altogether been annihilated.

Is not Armenian nationalism of the stubbornest? Turkestan itself may some day startle us.

The most original part of Mr. Van Gennep's book lies in an attempt to show under the principles, beliefs, symbols appealed to at different times, by different peoples, under what he calls the external elements of nationality, the constancy of a certain phenomenon which consists in a people's assertion of themselves as distinct from others. Such a conception might well be expected from the author of *Rites de passage*. A whole chapter is devoted to such symbols of differentiation as tattooing, mutilations, body-marks, by which at primitive levels, group affiliation is signified. Food, dress, houses, village organization, the whole complex of customs and mores are also drawn upon to the same effect. However, Mr. Van Gennep does not always make it quite clear whether he thinks that a collectivity having realized its being different from others generated group feeling, or if it purposely used marks in order to emphasize distinctness. On the whole he seems to favor the latter view which certainly cannot fail to strike one as somewhat tinged with teleologism. The way in which people use a certain trait is no criterion of its origin. Language was not used as a symbol of differentiation between nations till about the end of the eighteenth century. There is ample evidence that men spoke before. Totemic features may have had a long history before they were finally selected as group symbols.

In the chapter devoted to language Mr. Van Gennep shows what importance it artificially acquired in the hands of governments during the latter part of the last century. Linguistic distinctions were in some cases violently denounced, as in France during the Revolution when they threatened the unity of the nation, France then being ingenuously or purposely considered as the country where French is spoken. They were set up as political instruments to defeat other languages as Mazurian already mentioned; hence a Mazurian nationality. Only the *Dictionnaire philosophique* could do justice to the niceties of Austrian census collectors in their attempts to distinguish between *official*, *provincial* and *usual* languages. Such seriations either aim to deal with a bewildering diversity of languages or else to influence statistics so as to countenance obvious governmental policies. To the average Frenchman or Anglo-Saxon it must seem passing belief that there could be countries where a monoglot person is the exception. A very trying country to the census collector must also be Macedonia. In sheer desperation, apparently,

these officials have become inventive. Hence such ethnological pearls as "Hellènes d'origine Tsigane" or "Hellènes bulgarophones" or still better, "floating" Bulgarians, Serbians and Greeks, at the mention of which Mr. Van Gennep's prose betrays a smile. There is also the case of a man whose mother tongue was found to differ from that of his mother. Falsifications, of course, are to be expected. *C'est la guerre!* Rightly enough, Mr. Van Gennep refuses to listen to people who pretend that such defective statistics can be corrected by the application of a standard coefficient of error.

The problem of frontiers is dealt with in the last part of the book. This is another symbol of differentiation and as artificial as any other. Neither rivers nor mountains are ultimate boundaries. Mr. Van Gennep briefly discusses the two concepts of frontier or marche and limit or boundary, the former, he points out, of more ancient status than the latter. The geographic units formed by the interrelation of mountain, river, plain and sea in the fluvial basin further comes under his attention, the most satisfactory of all territorial bases advocated for the nation. Lastly, he takes issue with L. Dominian on the question whether natural regions and linguistic frontiers coincide, holding against the latter that they do not. A map itself, he observes, may become a symbol of differentiation, an equivalent of the flag, the cartographic symbol. There is a superstition of mathematics as something that never errs. There is likewise a superstition of the map. It engenders those of the historic frontier and of the collective name. These, like language, are impressed upon the child in the primary schools. Thus we simplify things to teach them to children. Should we now wonder that this forced simplicity should make ultimately for a certain reduction in the scope and depth of our culture? Education, in short, is getting the better of culture. The cult of the average is another symbol which Mr. Van Gennep might well have studied.

P. L. FAYE

Psychologie des primitiven Menschen. (Handbuch der vergleichenden Psychologie, Band I, Abteilung 2, pp. 145-320, 76 figs., 16 pls.) RICHARD THURNWALD. München: Kafka, 1922(?).

In his preface Dr. Thurnwald anticipates two obvious objections, one against the topical, culture-historical arrangement of the book, and the other against the scant treatment allotted to the religious and philosophical aspects of culture. In reply to these points he

insists that the dearth, or rather absence, of preparatory labors made any other procedure well-nigh impossible; while the subtler aspects of culture must be apprehended in their general cultural context and have, moreover, found extensive treatment in other recent essays of his. While a certain justification cannot be denied to both propositions, the result is necessarily disappointing, inasmuch as the distinctive illumination that might be furnished by psychological principles is inevitably very much reduced, and that precisely on those questions they are best capable of clearing up.

It is naturally impossible to follow Dr. Thurnwald through all the field of anthropology in this brief notice and a summary statement must take the place of elaborate analysis. On the whole, the author impresses one with his robust common sense, which prevents him from championship of extreme views. The last section on "Geistesverfassung" is especially suggestive of psychologico-ethnological synthesis, but unfortunately the author's over-conciseness prevents him from doing justice to the subject, and the reader who has no access to his other articles feels balked at the most interesting part of the inquiry.

The bibliography is remarkable for the inclusion of American titles, which are so commonly ignored by European scholars.

ROBERT H. LOWIE

AMERICA

Beothuk and Micmac. FRANK G. SPECK. (Indian Notes and Monographs. Museum of the American Indian, Heye Foundation.) New York, 1922. 187 pp., 42 pls., 3 figs., 2 maps.

This publication comprises two independent papers—"Studies of the Beothuk and Micmac of Newfoundland" (pp. 11-80) and "Micmac Hunting Territories in Nova Scotia and Newfoundland" (pp. 81-156). In the former Professor Speck discusses the relations of the Micmac to the "Red Indians," sketches the ethnology of both, and sets before us the information gleaned from Santu, an old Indian woman, "who claimed that her father was one of the last survivors of the Red Indians of Newfoundland," a statement which, it seems, met with unwarranted skepticism on the part of other writers. Professor Speck views the Beothuk as an archaic member of the Northeast Algonkian group, both culturally and linguistically (p. 69 f.).

In the second paper the author reverts to a subject peculiarly his own, the theoretical significance of which has but recently come to be recognized. The Micmac, like their congeners, have definite family territories, though these are less permanent and hereditary than elsewhere in the area, while the chief enjoys greater authority in the redistribution of the territories (pp. 86, 94). The occurrence of these privileges is attested by a missionary as early as 1691.

Several other ethnographic details of great interest are mentioned, e.g., the practice of temporary matrilocal residence by the Micmac and their neighbors (p. 90) and their skill as "map-makers, utilizing birch-bark for the purpose of charting not only travel routes but hunting territories as well" (p. 98 seq.). This custom is shared by the Montagnais (p. 106) and will recall to the comparative ethnographer the Eskimo maps, to which Galton paid such high praise.

The numerous illustrations greatly add to the value of the interesting little volume.

ROBERT H. LOWIE

ASIA

The Lhota Nagas. J. P. MILLS. London: Macmillan and Co., 1922. xxxix, 255 pp., 27 pls., 3 maps.

The Government of Assam has long recognized the need and value of adequate anthropological study of the many native tribes under its jurisdiction. The latest addition to the fine series of such monographs published by its direction is this volume on the Lhota Nagas, to which Mr. J. H. Hutton, author of the monographs on the Angami and Sema Nagas, contributes a valuable introduction.

Earlier volumes in the series have dealt with the Nagas of Manipur on the southern border of the Naga Hills, and with the Angami and Sema of the more central districts; the Lhota, on the other hand, occupy the northern edge of the region, toward the Assamese plain. The tribes known generically as Nagas do not form a group easily distinguishable from the other peoples of Assam. They are clearly a very mixed group, comprising elements derived from various sources, blended in varying proportions in the several tribes. In his introduction Mr. Hutton distinguishes a northern or northwestern element of Tibeto-Burman speech allied to the Akka, Mikir, etc., an ancient Mon-Khmer factor, a small eastern or Thai influence, and a strong southern immigration allied to the Kuki-Lushai-Chin peoples,

which drove before it still another very different racial element, which became the predominant factor in the Angami.

Culturally the Lhota Nagas may be described as a sedentary folk, living in ridge-top villages and cultivating rice as their main food product by the wasteful jhuming or slash and burn method. In this latter particular they are in sharp contrast with the Angami, who have developed terraced irrigation to a high degree. The Lhota are good weavers and potters, but poor smiths, metal-working being looked down upon and regarded as unlucky. Dogs, pigs, goats and mithan are kept as domestic animals. The weapons in use are the dao or heavy knife, the spear and the cross-bow, while for defense large matting or hide shields are used. The Lhota house is smaller and less elaborately built and decorated than that of the Angami or Sema, and unlike the Angami every village includes a Morung or men's-house.

The Lhota are grouped in three phratries, distinguished by the use of different terms for "mother," and these are in turn divided into a series of clans, which are further split into kindreds. The original strict exogamy between phratries and clans is now in process of breaking down. Polygamy is the rule for all who can afford the purchase of more than one wife. Each village forms an independent unit politically, although, in war, leagues between several villages were often formed. The villages were formerly ruled by chiefs aided by a council of old men, but, since war and head-hunting have been stopped by the British occupation, the importance of the chief has largely disappeared and the council is today the only active governing force.

The religious conceptions of the Lhotas involve a belief in a series of upper worlds occupied by deities who play only an unimportant part in human affairs. Every village has a priest or Puthi who holds office for life, and directs the ceremonial life of the people. The ceremonies are very numerous and are mainly grouped under the head of "gennas," i.e., ceremonies involving a number of taboos of the type so widespread in southeastern Asia. The series of social gennas, whereby a man attains greater and greater social rank, culminating in those in which large monoliths are dragged to and set up in the village, is, as among most of the Naga tribes, of great importance and interest. In these and other ceremonies, animal sacrifice plays a large part. The dead are buried, in some cases in dug-out, boat-shaped coffins. The spirit is supposed to go to an under world.

As in the previous volumes dealing with other Naga tribes, there are among the Lhota a large number of cultural elements which find striking analogies in parts of Indonesia and the rest of the Oceanic area, and serve once more to raise the interesting but still unsettled question of the probable relations between the peoples of southeastern Asia and the islands of the Pacific region. If we but had for the tribes of French Indo-China anything comparable to the series of monographs, of which the present volume on the Lhota Nagas forms a part, we might well be much nearer the solution of the problem. In the absence, however, of any adequate studies of the wilder tribes of the southeast, we must be doubly thankful for the fine studies issued by the Assam Government, and hope that other volumes as admirable as this on the Lhota may be added to the series.

R. B. DIXON

MISCELLANEOUS

Essais de folk-lore biblique. P. SAINTYVES. Paris: Librairie critique Emile Nourry, 1923, xvi, 483 pp.

Quite recently, in these columns, a book by the same author was the object of a review. Most of the criticisms we had then occasion to make apply to the present volume. Mr. Saintyves is the most diligent and painstaking collector of facts. His chapters are like showcases where specimens are displayed with condensed information on the labels. He takes you around, calls your attention to this or that particular fact, obviously delights in the size of his collection, but at the end of the tour you are, perhaps, left a little to yourself to draw conclusions.

In this book the author studies six folk-lore motives, namely, the fire that descends from heaven, Aaron's blossoming rod, water gushing out of rocks, magic circuits around towns, the transformation of water into wine, and the multiplication of the loaves. The thesis he mainly advocates is that the origin of such motives can be found in rites of a seasonal or apotropoeic nature. Mention of *The Golden Bough* is frequently made in footnotes. As a popularizer of Frazer, Mr. Saintyves lacks the readiness of style, the ability of presentation, which characterize the articles of Mr. S. Reinach. His studies are exceedingly conscientious; he nevertheless manages to steer the reader through a redundancy of variants with the minimum of taxation upon one's good will.

In the preface the author defends the symbolistic interpretation of myth motives against the pure rationalist school which, he says, in a field where mana runs high, is likely to miss the point. This theory would ultimately justify a definition of the scientist as artist. Special gifts of imagination fit you to interpret a certain phase of religion or culture. Is interpretation, however gifted, knowledge? The symbolic cast characteristic of the archaic mind worked egregiously in the case of a Cushing's interpretation of Zuñi life. His experience was probably unique. The scientist does not derive individual experiences from the material he studies. Something stops where he knows. However, there it is for us to know without further criticism of the fact.

P. L. FAYE

SOME NEW PUBLICATIONS

Buxton, L. H. Dudley. The Ethnology of Malta and Gozo. (Journal of the Royal Anthropological Institute of Great Britain and Ireland, LII, 1922, pp. 164-211.)

Cole, Fay-Cooper. The Tinguian: With a chapter on Music by Albert Gale. Social, Religious and Economic Life of a Philippine Tribe. (Field Museum of Natural History, Publ. 209, Anthrop. Series, XIV, No. 2, 1922, pp. 228-493, 83 pls., 26 figs.)

Friederici, Georg. Malaio-polynesische Wanderungen. (Sonderabdruck aus Verhandlungen des XIX Band d. Deutschen Geographentages zu Strassburg i. Els. 1914.)

——. Reviews of E. Nordenskiöld, A. Wichmann, E. W. Dahlgren, Hans Staden von Hornberg (Göttingische gelehrte Anzeigen, 1920, 185-189; 1922, 300-305; 1923, 145-150).

Haddon, A. C. Review of Goldenweiser's "Early Civilization." (Nature, Aug. 11, 1923, 198f.)

Lehmann-Nitsche, R. El grupo lingüistico Tshon de los territorios magallánicos. (Revista del Museo de La Plata, 1914, XXII, segunda serie, IX, 217-276.)

——. El grupo lingüistico Alakaluf de los Canales Magallánicos. (Ibid., XXV, 15-69, 1919.)

——. El grupo lingüistico "Het" de la pampa Argentina. (Ibid., XXVII, 10-85, 1922.)

Lebzelter, V. Beiträge zur physischen Anthropologie der Balkan-halbinsel. I Teil. (Mitteil. der Anthrop. Gesell. in Wien, LIII, 1923, 1-48.)

Radin, Paul. The Winnebago Tribe. (37th Ann. Rept. Bureau of American Ethnology, Washington, 1923, pp. 35-560, 58 pls., 38 figs.)

Reisner, George A. Excavations in Kerma. Parts I-III., IV-V. 2 vols. (Harvard African Studies, vols. V and VI.) Peabody Museum of Harvard University: Cambridge, 1923. XVI, 528 pp.; XXIV, 559 pp.; 78 pls., 26 plans, 345 ills.

Rice, William Hyde. Hawaiian Legends. Bulletin 3. (Bernice P. Bishop Museum, Honolulu, 1923.) 137 pp.

Scheidt, Anthropologie und Rassenbiologie. (Archiv für Rassen- und Gesellschafts-Biologie, 1923, XIV, 416-424.)

Stigler, R. Ethnographische und anthropologische Mitteilungen über einige wenig bekannte Volksstämme Ugandas. I. Teil. (Mitteil. der Anthrop. Gesell. in Wien, LII, 1922, 197-261.)

Tello, Julio C. Wira Kocha. (Inca, I, 1923, 93-320.)

Ten Kate, Herman, Aan de chinesische Kust. (Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap, Tweede Reeks Dl. XL, No. 2, March 1923, pp. 97-106.)

Thurnwald, R. Die Gestaltung der Wirtschaftsentwicklung aus ihren Anfängen heraus. (Sonderabzug aus dem Sammelwerk: Erinnerungsgabe für Max Weber: Die Hauptprobleme der Soziologie, 1923, 2 vols. I, 273-333.)

DISCUSSION AND CORRESPONDENCE

Professor Mendizabal and the Náhuan Chronology

While the points raised by Professor Mendizabal in his article in the present number of the *Anthropologist* deserve to be given due consideration, the theory which he advances runs counter to the generally accepted belief of Americanists in several important features. It takes no account of the demonstrated precedence of the Mayan calendar over that of the Mexicans in point of time. It does not bring out the fact that no actual correlation between the movements of Venus and the Mexican calendar has been demonstrated in inscriptions or native manuscripts and that such correspondence as has been noted applies only to the general proposition that eight solar years of 365 days equal five Venus years of 584 days and that both of these in combination with the tonalámatl make a cycle of 104 years. This cycle would be five days out on Venus and twenty-five days out on the tropical year making a total divergence of thirty days in one round. The early Mayan inscriptions show no demonstrable relation to Venus, although the symbol for this planet appears in the later ones.

Erroneous Identifications of "Copper Effigies" from the Mound City Group

The October-December 1922 number of the *American Anthropologist* (Vol. 24, No. 4, pp. 397-431) contains an interesting article by William C. Mills, entitled "Exploration of the Mound City Group, Ross County, Ohio."

Among the illustrations are several of copper "effigies" identified as "eagles." One of these (Fig. 44) has the large eye and short, strongly decurved bill of an eagle and doubtless is correctly labeled. The others, as any ornithologist can tell at a glance, are wrongly identified. Thus Fig. 37, labeled "effigy of eagle heads" shows the small eye and relatively long straight bill, hooked at the tip, of the common turkey buzzard or vulture, while Fig. 46, labeled "effigy of eagle made of copper," has the massive hooked bill, notched and lobed at base, characteristic of the parrots.

In addition to the bird effigies figured, there is a curious elongate object (Fig. 49) called "effigy horn of the mountain goat" which bears no resemblance whatever to the horn of that animal, but which suggests, though it by no means actually resembles, the horn

of a mountain sheep. It may have been copied from some kind of fossil, but could not have been intended to represent the horn of any American mammal.

The misidentifications to which attention is here called are by no means unique, for unhappily the literature of anthropology and archaeology abounds in more or less similar cases.

To a naturalist, the complacency with which certain authors distribute names of mammals, birds, and reptiles in the legends referring to figures on pottery and other objects is truly appalling—and it might be added that the publication of such easily avoided errors hardly tends to inspire confidence in an author's thoroughness. Surely persons familiar with the dominant types of our native fauna are not so scarce as to imply difficulty in obtaining the correct names of most of the animals figured.

I may be pardoned for reiterating what I have said many times before, namely, that since our Indians are born naturalists—naturalists by inheritance and daily association—it seems strange that our schools of anthropology and archaeology fail to recognize the importance of preliminary training in natural history.

C. Hart Merriam

A Last Word to Professor Dixon

On page 109 of the present volume of this review, Prof. R. B. Dixon ends in a personally disparaging way a note in reply to my comments on his criticism of my *Essai sur l'origine des Dénés*. Considering that, in answer to private representations, I had explained to him that my taking his reference to the cultural origin of the Dénés for a hint at the ethnic cradle of the same was due to a mere physical accident—one word hidden, as it were, in a crease of the typewritten copy of his article sent me by an American correspondent, after which I had written while on the wing—I am rather surprised to see that he should resort to a suggestion of dishonorable tactics on my part. The learned professor makes the most he can of that slip, which he seems to give as covering the whole question at issue, and he would fain have us believe that it condones his other strictures on my book. In simple justice to my treatment of those features, which he represents as wholly uncritical, I may be allowed to reproduce herewith what I wrote him on January 3 ultimo.

> You do not tire repeating that such and such practices "are so almost universally spread among the uncivilized peoples of the world, that the

fact of their occurrence among the Dénés and tribes in Northeastern Asia has really no signification whatsoever," and that others "are to be found among savage peoples in all parts of the world," etc. Which seems to mean that, according to you and your school of thought, sociology can scarcely be of any value in clearing up ethnographical problems. Nay, you specifically say so in the case I studied when you declare that "the problem of the origin of the American Indian . . . can never be solved by the comparison of a number of relatively superficial or general cultural elements," such, in your opinion, as those I adduced in my little book. Which evidently means that primitive society is the same the world over.

Yet, my dear sir, kindly put yourself in the place of an inquirer who, while familiar with the details of the normal Déné sociology, suddenly comes upon a related tribe which practises the potlatch and follows matriarchy, contrary to what prevails among all the primitive Déné peoples. Will not the presence of those two features in the social organization of that particular tribe immediately suggest to his mind contact with aborigines who exhibit the same? If such is the case between tribes whose habitat is now coterminous, why should it not be so in the case of those who do not at the present time live close to one another?

And then by your generalizations do you mean to say that you see no difference between the sociology of, for instance, the Hottentots and that of the Patagonians, between that of the Bushmen and that of the Plains Indians, who but yesterday were all primitive peoples?

Of course, that may be the case with you, and you are quite free to so believe; but surely you will not insist that all students share your views, or give these as incontrovertible ethnographical rules? Which, however, does not in the least prevent me from attaching but a limited importance to mere sociological items. To me a few really authentic linguistic similarities would in this respect, be far more valuable than the presence of several customs among different divisions of mankind. But I hold that we must take the latter as at least hints at the probability of former intercourse, especially when we have geographical nomenclature (about which I notice that you are again silent) which points in the same direction.

And, pray, do not fail to remark that I would scarcely see any real ethnological value in sociological similarities taken separately as you mention them; their importance lies not in themselves but in their number.

Another point of which I wish to remind you is that I do not give as exclusively Jewish in origin even those practices which I refer to the book of Leviticus—and I cannot help thinking that fairness and impartiality should have made you refer to this. On the other hand, despite your contention that "no one who knows the history of the Asiatic continent can for a moment accept as possible any Jewish influence of moment, except in rather limited areas of its Western edge," I hold that, much over a thousand years ago, Jews were numerous and relatively powerful even in Eastern Asia, nay in Peking itself. Were I not so far away from my books and notes, I could give you of this proofs that would probably surprise you.

Had not this communication become already so long, I might expatiate on your inability to see any ethnographical value in the simultaneous presence

in both the Old and New Worlds of the remarkable legend given and commented on in my Chapter XV. And here I cannot refrain from suspecting prejudice and preconceived ideas. Why, my dear sir, behold two different peoples now living far apart, who possess not only the same legend—which might not mean much—but a legend which is found with the very same typical details such as the one I quote, and you claim that this means nothing, that it does not hint at any contact or commerce of some sort in the past! Well, pray, how did both peoples happen to get such striking resemblances, nay identities, in their mythology? Was it owing to some kind of revelation? . . . Are these details—not the legend itself—inborn with the human mind, or some sort of natural instinct with man? For their amazing analogy must have a cause. What is this according to you?

A. G. Morice, O. M. I.

A Further Note on the Origin of the Dream Dance of the Central Algonkian and Southern Siouan Indians

In the April-June number of the *American Anthropologist*, Dr. Truman Michelson calls attention to a published account of the origin of the so-called "Dream Dance" of the Central Algonkians, in which the statement is made that the ceremony originated from an experience of a young woman of the Sioux about May, 1876. This Dr. Michelson accepts as correct, and says, "In short the ritualistic origin 'myth' is substantiated as history."

As a matter of fact, however, the writer has been informed repeatedly by Menomini that the ceremony was introduced to them by the Prairie Potawatomi as early as 1862. The reception of the ceremony by the Menomini was so enthusiastic as to alarm the timorous agent then in charge of them, who ordered them to cease dancing. This the Indians refused to do, and, finally, on the insistance of the agent, they drove him away with threats. The agent, in a paroxysm of fear, at once wired Washington for troops to put down the "outbreak," and, as it happened that troops fresh from fighting the Sioux in Minnesota (1862 was the year of the Minnesota outbreak), were near at hand, they were at once ordered to the spot.

On the arrival of the soldiers, the Menomini took to their heels, and the soldiers were left wholly unmolested, greatly to the surprise of their commanding officer who had been led to expect fighting of a sanguinary nature. The Menomini relate that he finally captured some decrepit or disabled person, and from this source learned that the Menomini had no thought of war, and that the ceremony was

eminently a religious and peaceful one. The Indians further relate that he at once requested that the troops be withdrawn, and that this was shortly done, the Indians by this time having returned to their homes and fraternized with the soldiers. It is said that the Government removed the agent on receipt of the report of the officer in command of the soldiers.

The spot where the initial ceremony was held is still pointed out, and the original drum was in the possession of the late Ksewatosa up to the time of his death a couple of years later.

The Prairie Potawatomi declare that the ceremony came from a Santee Dakota girl, but their origin myth gives her an Algonkian name, and seems to make her an Ojibway of Minnesota.

The ceremony is found not only among the Ojibway, Menomini and Muskwaki, as mentioned by Michelson, but occurs also, according to first-hand information, among the Sauk, the Kickapoo, and the Winnebago and Ioway of Siouan stock. I suspect that it is related more closely to the Omaha or Grass Dance of the Dakota than to any other ceremony.

ALANSON SKINNER

OBSERVATIONS ON SAPIR'S "A NOTE ON SARCEE POTTERY"

In Dr. Sapir's opening paragraph concerning the occurrence of Pottery among the Sarcee he states that Wissler makes no mention of the use of pottery among the Blackfoot in his "Material Culture of the Blackfoot Indians." (*Anthropological Papers of the American Museum of Natural History*, Vol. V, pp. 1-175, 1910.) Dr. Sapir is mistaken, because several accounts of Blackfoot pottery making may be seen on page 26 of this interesting paper.

Dr. Sapir also states that "Archaeological findings as to the distribution of pottery in northern Algonkian areas are not corroborated by anything that we can learn from such tribes as the Malecite, Cree, or Saulteaux of today, or that we could have learned from some of them even a hundred years ago."

In this connection I should like to call Dr. Sapir's attention to the following paragraph in the writer's article, entitled "The Northern Saulteaux," Vol. IX, *Anthropological Papers of the American Museum of Natural History*, 1912, p. 130. The information was obtained from some Saulteaux encamped on Lac Seul opposite the old Hudson Bay Trading Post:

> Up to fairly recent times pottery was manufactured by some remote bands. Selected clay was dug and tempered by kneading a fine gravel or

coarse sand into it with the fingers. It was then made into rolls and the vessels were built up by the coil process, beginning at the middle of the bottom and winding the coils around outward and upward to make the sides, which were then smoothed over until the appearance of the coils was effaced. When complete, the vessel was dried before the fire. However, firing eventually took place when the vessel was used. In cooking, the kettle was set upright in the sand or propped up with stones and the fire built around it. Some Saulteaux from Trout River near Lac Seul still claimed to be able to make pottery in 1909, but when put to the test they did not succeed. Potsherds are found on some old camp sites in Lac Seul, notably at Manitou Island, but the writer was not able to obtain any at this place.

This description is altogether too circumstantial to be mere guess work or folk-memory on the part of the writer's informants, and it would not surprise him in the least if some of the isolated bands of Saulteaux should be found still using pottery in times of stress.

In a paper entitled, "Notes on the Plains Cree" (*American Anthropologist*, N. S. 16, 1914, p. 82) the writer remarks "In ancient days pottery vessels are said to have been used, but no one now knows how they were made." A few potsherds were found by the writer on what the Plains Cree declared was an ancient camp site of their people on Round Lake north of Broadview, Saskatchewan, and, if he is not mistaken, these were forwarded to the Victoria Memorial Museum with this information at the time.

The Bungi or Plains Ojibway, also called Saulteaux, at Long Plains, near Edwin, Manitoba, were also found in 1913 to possess a vague memory of the use of pottery, but none of the method of its manufacture, so that all knowledge or tradition of its existence and use is not lost among the northern Algonkians. In fact, among none of the Algonkian or Siouan tribes ever visited by the writer has so good an account of the making of native pottery been secured as from the Northern Saulteaux of Lac Seul, Ontario.

Incidentally, the Algonkian names of "Kettle" are instructive. In Ojibway (Saulteaux) we have "akik," in Cree "askik," and in Menomini "akax," all specifically meaning an earthen vessel, although the term is now applied to metallic utensils.

ALANSON SKINNER

BRIEF COMMUNICATIONS

Note on State Archaeological Surveys

Since making the last report for the State Archaeological Surveys Committee of the National Research Council, some additional information has come to hand, indicating gratifying progress in many States. Also, the Committee has been reorganized, as follows: Clark Wissler (*Chairman*), Peter A. Brannon, Charles E. Brown, Amos W. Butler, R. B. Dixon, F. W. Hodge, Marshall H. Saville. The Chairman of this Committee will welcome information from every organization interested in State Survey projects.

New State Societies. Encouraged by the enviable success of the Alabama Anthropological Society similar organizations are being formed in Georgia, Mississippi, and Louisiana.

Illinois. In Illinois, during the current year, Mr. Warren K. Moorehead extended his work on the Cahokia Group, sounding a number of small mounds and completely excavating three of the larger mounds. Nothing was found in the small mounds, suggesting that they are not burials.

South Carolina. A State Survey has been organized by Miss Laura M. Bragg of the Charleston Museum.

Tennessee. The State of Tennessee has appropriated money for the erection of a State historical building. It is the intention to set apart one or more rooms in this building for the housing of the archaeological and historical collections of the Tennessee Historical Society.

Mr. A. F. Ganier, 2507 Ashwood Avenue, Nashville, Tenn., has made a most excellent map of the archaeological remains along the Harpeth River, in Cheatham County, Tenn.

Mr. Charles K. Peacock, department of manual arts, Dickinson, Jr. High School, Chattanooga, Tenn., has been doing a considerable amount of field work. He has made an interesting study of "Fort Mountain," Ga. Fort Mountain is near the point where the states of Tennessee, North Carolina, and Georgia meet.

Messrs. Joe D. Taylor and Henry Woodman, of Bristol, Tenn., have been making a number of field explorations in that vicinity.

Dr. A. Hrdlička, of the U. S. National Museum, visited Bristol and examined a large deposit of human bones found in a burial cave on Holston River, about 20 miles northwest of Bristol.

Mr. W. O. Whittle, Knoxville, Tenn., has been doing field work in his locality.

Mr. Whittle obtained photographs and fragments of the so-called "pictograph wall" near Charleston, Tenn. This "wall" was also visited and studied by Dr. John P. Peters, of the University of Pennsylvania. Dr. Peters found this so-called wall to be up-tilted strata of ripple-marked sandstone. The so-called hieroglyphics he found to be the tracks of ancient trilobites. Dr. Peters reported, in part:

The so-called "hidden wall" is a sandstone dyke. In that immediate locality some internal pressure has driven the sandstone up at various angles and in various directions. The "wall" itself runs north and south about 1200 ft. losing itself in the northern end in a much higher hill, at the south end flattening out into a rounded knob. Toward the westward it descends 150 or 200 ft. into a larger valley. On the east there is a very much smaller valley, the bottom of which is perhaps 50-75 ft. below the level of the top of the dyke.

The rock is sandstone. The force which drove the dyke up operated on the east side regularly thru the whole 1200 ft. of length tilting the strata almost at an angle of 90°, bending very slightly off the perpendicular toward the east. The strata are very numerous, and very narrow, not more than an inch or so in breadth, with an occasional cement-like stratum between, for the most part. They vary considerably in color and in solidity, from rotten rock, which can be almost spaded out, up to the hard rock in the center.

The center strata, by the heat, I presume, resulting from the friction, have been solidified into a hard but very friable sandstone, which breaks up readily on exposure to air in a manner which has suggested to those unused to the habits of this friable rock that the innumerable pieces of stone lying about are due to human workmanship in breaking the rocks to make the "wall." Tipped as the dyke is, the soft strata on both sides have worn down under the weathering, bringing out on the top the dyke of hard stone strata like a wall. At one point on the upper side, and apparently only at one point, on one of these hard strata, there show on the upper or western side innumerable markings of trilobites or other similar creatures. It is here that most of the excavation has been conducted, to a depth of 20 ft. or more and a breadth of about the same. As far as the digging has gone down these markings continue, always on the same stratum and only on the western or upper side of the same. This stratum is separated from the one immediately to the west by a space a little larger than usually separates the strata. Into this crevice has oozed down a decomposition of the soil and the rock above, forming an almost putty-like substance, salty to the taste, which was mistaken by those who found it for an artificial cement. Exposed to the air this quickly hardens and becomes part of the rock to which it is attached, and cannot then be separated from it without breaking the rock. When first taken out, however, it can be readily pried off, and is in some places so soft that it can be taken off like putty with

the fingers. In this clay filling about 10 or 15 ft. below the surface were found two copper chisels. These were made out of copper bars, round, about ⅜-¾ inch in diameter, one end being hammered out to a flat, sharp sur ace. The one that I examined had been blunted and nicked in an attempt to cut or break rock. About 100 ft. to the east of this main excavation, on a little plateau or step, part way down the ridge was found a second wall of the same general formation of stone, somewhat variant in color and texture, however. At this point were dug out eight heavy pottery figures, each about one foot in height, human images of a rude type, and one pottery plate with some attempt at decoration. As I have not seen the plate, I cannot describe the decoration which, according to the account given, was not colored, but raised work. Similar figures and pottery have been taken out, I was told, in the Indian mounds along the Hiawassie River on which Charleston is situated, and thru the valley of which one drives in covering the five miles from Charleston to the "hidden wall." The hidden wall is south and east of the valley, about 1½ miles distant from the river at its nearest point.

This wall was first discovered, Mr. Hooper tells me, by his grandfather, in 1891. At that time occasionally Indians would visit the spot which they seemed to regard as sacred. The particular point which was sacred was about where the main excavation has taken place. Excavations to the north and south have revealed the line of the so-called "wall," showing the same geological formation thru-out, but nowhere else have these excavations revealed any markings. I should judge that the Indians had found at this one spot stones with markings, the mysterious character of which led them to regard the place as sacred. Hence on th flat place a little below it are the deposits which have been mentioned of figures and potteries, representing either burials or some form of worship or reverence connected with the place. The two copper chisels found in the cement material between the marked stratum and the one immediately above it would seem to show that at some period Indians had tried to remove the stratum above and lay bare more of the wall, or get out more of the marked stones, the chisels having been dropped thru by accident in that operation.

Photographs of this wall were also examined by Dr. C. D. Walcott, Secretary of the Smithsonian Institution, who likewise identified them as the tracks of trilobites.

Mr. Hiram L. Ridge, 1109 Joseph Avenue, Nashville, Tenn., did a considerable amount of exploration of the ancient stone-slab graves in the vicinity of Nashville.

Messrs. R. H. Gray and J. R. Hancock, of Fayetteville, Tenn., have been instrumental in locating a large number of hitherto unreported mounds, cemeteries, and village sites, in Lincoln county, Tenn.

The writer has been at work on the ancient Indian trails of Tennessee and the adjoining southern states.—W. E. Myer.

CLARK WISSLER

ANTHROPOLOGICAL NOTES

"The Missaukee Archaeological Preserve"

A gentleman who does not care to have his name published has given the Museum of the University of Michigan a fund sufficient for purchasing a tract of one hundred and twenty acres in Missaukee County. Upon this tract are two "circles" or enclosures of earth. The dimensions of each are about one hundred and ninety by one hundred and sixty feet. The banks are from four to six feet high, with a ditch or moat upon the outside, from two to four feet deep. The "works" are of considerable age as there are within them, and also upon the banks, pine stumps not less than forty-six inches in diameter. Near the enclosures there are more than a hundred "pits," some of them "confluent," in depth from three to seven feet. There are a few mounds also upon the tract, but, unfortunately, these have been vandalized. The State had several hundred acres of land upon which the taxes had become delinquent, adjoining the purchase, which are added to the tract. No one has at this time an opinion to express as to the Indian constructions and remains upon the land. The object is to save them from destruction and, so soon as opportunity and means permit, to make explorations under trained observers. Of course the earthworks will be cared for and preserved as outdoor specimens of the University Museum. The several hundred acres, which will be known as the Missaukee Archaeological Preserve, also serve as a sanctuary for wild life and are placed under proper supervision and expert control.

W. B. Hinsdale

Mr. Alanson Skinner, Curator of Anthropology of the Public Museum of the City of Milwaukee, spent several months in the field during the early spring, visiting the Sauk, Kickapoo, and Potawatomi Indians of Oklahoma and Kansas. Mr. Skinner secured a large number of sacred bundles, costumes, and other material from the tribes in question, and on his return brought to Milwaukee with him Wa'pûkä, better known as Sam Bosley, a notable man of the Eagle gens of the Prairie Potawatomi, from whom he obtained an enormous quantity of ritualistic material, together with data on the social and ceremonial organization, material culture and other customs of the tribe. Mr. Skinner also secured the assistance of

an aged Potawatomi named John Nuwi, of Arpin, Wisconsin, from whom much additional data was obtained.

MR. M. R. HARRINGTON of the Museum of the American Indian (Heye Foundation), of New York, spent part of the winter and early spring in the field in the Ozark region of Missouri, and Arkansas, working out rock and bluff shelters in which he found traces of an hitherto unsuspected culture, some of the artifacts including atlatls, throwing darts with cane shafts, hardwood foreshafts and flint points, (but no bows or arrows), splint and cane basketry of southeastern type, woven bags like those of the Central Algonkians, woven water bottles caulked with pitch but few traces of pottery. On the dessicated body of a man were discovered leggings of the spirally wrapped puttee type worn by Pueblo Indian women and moccasins puckered at the toe like those of the Menomini.

AT the annual meeting of the Wisconsin Archeological Society, Mr. Alanson Skinner was elected president of that body.

MR. A. I. HALLOWELL has been appointed to the position of Instructor in Anthropology at the University of Pennsylvania.

THE ANGRAND PRIZE has been awarded to Dr. Erland Nordenskiöld.

Following is the list of speakers and of papers read before the Anthropological Society of Philadelphia during 1922–1923:

Oct. 25, Dr. J. W. Harshberger, "Notes on the Lapps and Lapland."
Nov. 23, Dr. W. W. Hyde, "Survivals of Ancient Demonology in Modern Greece."
Dec. 16, Dr. A. A. Goldenweiser, "Early Civilization."
Jan. 17, Dr. R. H. True, "Farming in the Old Stone Age."
Feb. 1, Dr. C. B. Davenport, "Heredity of Build."
Feb. 16, "Indian Night."
Apr. 11, Dr. Waldemar Jochelson, "Notes on the Innuit."
May 16, Dr. R. J. Kellogg, "Some Geographical Aspects of Early Indo-European Dispersion."

A CORRECTION.—In the list of papers presented before the American Anthropological Association at the last annual meeting, *American Anthropologist*, vol. 25, no. 1, pp. 125-127) a mistake was made in the name of the author of a paper on "The Incidence and Heredity of Facial Hypertrichosis and the Resistance of Hair to Certain Supposed Growth Stimulants." The author of this paper was Mildred Trotter.